USDA Natural Resources
Conservation Service

Ecological site R013XY005ID
Loamy 16-22 PZ ARTRV/FEID-PSSPS

Last updated: 9/23/2020
Accessed: 04/25/2024

General information

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

MLRA notes

Major Land Resource Area (MLRA): 013X–Eastern Idaho Plateaus

013X-Eastern Idaho Plateaus

Precipitation or Climate Zone: 12-16” P.Z.
https://soils.usda.gov/survey/geography/mlra/index.html

Classification relationships

Artemisia vaseyana/ 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 Unit: B (Northwestern Wheat and Range)
MLRA: 13 (Eastern Idaho Plateaus)

EPA EcoRegion: Level III (Middle Rockies)

Ecological site concept

Site does not receive any additional water.
Soils are:
not saline or saline-sodic.
moderately deep, deep, with < 3% stone (10-25”) and boulder (>25”) cover. not skeletal within 20” of soil surface.
not strongly or violently effervescent in surface mineral 10”.
textures usually range from very fine sandy loam to clay loam in surface mineral 4”.
Slope is < 15%.
Clay content is = <32% in surface mineral 4”.
Site does not have an argillic horizon with > 35% clay.

Associated sites

R013XY020ID	**Loamy Tall Brush 16-22 PZ ACGL/BRMA4**
R013XY022ID	**Subalpine Loamy 16-22 PZ ARTRS2/ELTR7-BRMA4**
R013XY024ID	**Loamy 22+ PZ ARTRV/FEID-BRMA4**
R013XY019ID	**Stony Loam 16-22 PZ ARTRV/PSSPS**

Similar sites

R013XY024ID	**Loamy 22+ PZ ARTRV/FEID-BRMA4**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata ssp. vaseyana* (2) *Purshia tridentata*
Herbaceous	(1) *Pseudoroegneria spicata* (2) *Festuca idahoensis*

Physiographic features

This site occurs on nearly level lava plains and terraces to sloping mountain slopes and foothills. The slopes range from 0 to 30, occasionally to 60 percent and are located on all aspects. Elevations range from 4500 to 9200 feet (1375 to 2800 meters).

Table 2. Representative physiographic features

Landforms	(1) Mountain (2) Terrace (3) Lava plain
Flooding frequency	None
Ponding frequency	None
Elevation	4,500–9,200 ft
Slope	0–60%
Water table depth	60 in
Aspect	Aspect is not a significant factor

Climatic features

MLRA 13, the Eastern Idaho Plateaus, is part of the Northwestern Wheat and Range Region. Its elevation ranges from 4209 to 9331 feet above sea level, with an average elevation of 5787 feet. The average annual precipitation is 16.41 inches, with a range of 13.56 to 18.75 inches, based on ten long term climate stations located throughout the MLRA. A spike in precipitation amount often occurs in late spring, usually in May.

Temperatures vary widely in the MLRA throughout the year. A maximum temperature of 103° Fahrenheit occurred at the McCammon climate station (# 105716; elevation 4770 feet), while a minimum of -41° was recorded at the Kilgore station (#104908). At all stations temperatures throughout the year are usually below the national average. Kilgore also recorded the greatest annual snowfall amount of 217 inches. The average temperature is 41.4 degrees F. with an average high of 55.3 degrees and an average low of 27.5 degrees.

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

Table 3. Representative climatic features

Frost-free period (average)	90 days
Freeze-free period (average)	123 days
Precipitation total (average)	19 in

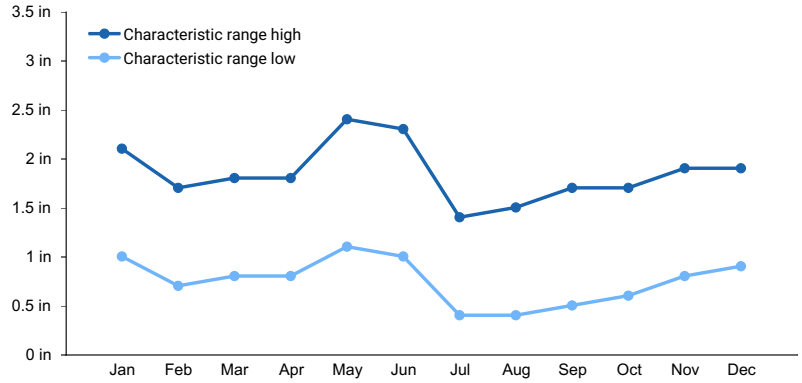


Figure 1. Monthly precipitation range

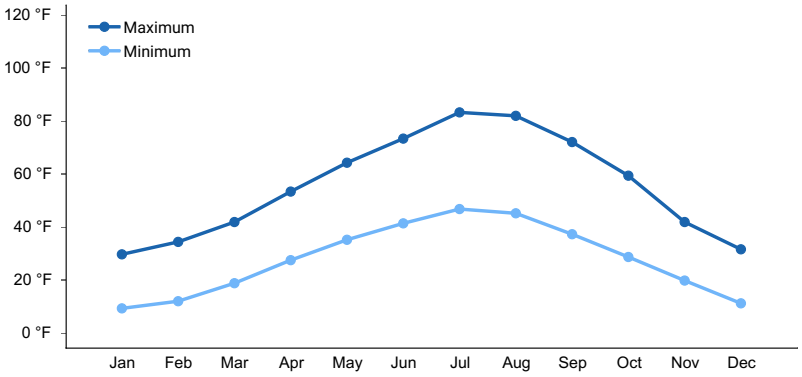


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

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

Soil features

The soils on this site are medium textured silt loams, loams, and gravelly loams that are moderately deep to deep. Some stones may be present in the profile. The available water holding capacity (AWC) is moderately high to high.

The soils on this site have silt loam, gravelly silt loam, very gravelly silt loam, loam, gravelly loam, very gravelly loam, or fine sandy loam surfaces that are moderately high in organic matter. Coarse fragments may be present in the profile. The soils are generally moderately deep to very deep to bedrock, but in a few cases can be shallow to bedrock. The soils are moderately well to somewhat excessively drained and have slow to moderately rapid permeability. Available water capacity is very low to moderate. The moisture supplying capacity of the soils is limited by the depth to bedrock. Water erosion can be high when the plant cover is reduced and slope increases. These soils are characterized by a xeric soil moisture regime and either a frigid or cryic soil temperature regime.

Soil Series Correlated to this Ecological Site

Bischoff
Bothwell
Broadhead
Brushtop
Burchert
Cadero
Causey

Clayburn
Crystalbutte
Dra
Dranyon
Fourme
Frenchollow
Hades
Hagenbarth
Hoopgobel
Huffman
Kabear
Karlan
Lanark
Lanoak
Lantonia
Ledgehollow
Lizdale
Manila
Moohoo
Obnot
Paulson
Pinebutte
Pinehollow
Pontuge
Povey
Prucree
Quirt
Ricrest
Ridgecrest
Robin
Searla
Sessions
Siroco
Slights
Splitbutte
Staberg
Stines
Swan flat
Trude
Vadnais
Whitetop
Wiggleton
Zeebar

Table 4. Representative soil features

Surface texture	(1) Gravelly silt loam (2) Very gravelly loam (3) Very cobbly sandy loam
Drainage class	Moderately well drained to somewhat excessively drained
Permeability class	Slow to moderately rapid
Soil depth	10–60 in
Surface fragment cover <=3"	0–35%
Surface fragment cover >3"	0–25%
Available water capacity (0-40in)	1.4–8.3 in

Calcium carbonate equivalent (0-40in)	0–15%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–3
Soil reaction (1:1 water) (0-40in)	4.5–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–60%
Subsurface fragment volume >3" (Depth not specified)	0–25%

Ecological dynamics

Ecological Dynamics of the Site:

The dominant visual aspect of this site is mountain big sagebrush and bunchgrass. Composition by weight is approximately 70-80percent grasses, 10-20 percent forbs, and 5-15 percent shrubs.

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

Fire has historically occurred on the site at intervals of 20-35years.

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 mountain big sagebrush in the overstory. Antelope bitterbrush is present. Subdominant species include prairie junegrass, Columbia needlegrass, Letterman’s needlegrass, big bluegrass, slender wheatgrass, and arrowleaf balsamroot. The plant species composition of Phase A is listed later under “Reference Plant Community Phase Plant Species Composition”.

Total annual production is 2000 pounds per acre (2222 kilograms per hectare) in a normal year. Production in a favorable year is 2400 pounds per acre (2666 kilograms per hectare). Production in an unfavorable year is 1300 pounds per acre (1444 kilograms per hectare. Structurally, cool season deep rooted perennial bunchgrasses are very dominant, followed by perennial forbs and tall shrubs being nearly co-dominant while shallow rooted perennial bunchgrasses are subdominant.

FUNCTION:

This site is well suited for big game in the late spring, summer, and fall. It is also well suited for livestock and recreation use in the summer and fall.

Due to the relatively high rainfall and elevation on this site, it is fairly resistant to disturbances that can potentially degrade it.

Due to the gentle topography, infiltration is normally high and runoff low. Runoff, when it does occur is non-erosive except during high intensity convection storms. Snow accumulates on the site due to high elevation and presence of tall shrubs.

Impacts on the Plant Community.

Influence of fire:

In the absence of normal fire frequency, mountain big sagebrush and antelope bitterbrush increases. Grasses and forbs decrease as shrubs increase. If a Rocky Mountain juniper seed source is in the vicinity, juniper will invade.

When fires become more frequent than historic levels (20-35 years), mountain big sagebrush and bitterbrush are reduced significantly. With continued short fire frequency, big sagebrush and antelope bitterbrush can be completely eliminated along with many of the desirable understory species such as bluebunch wheatgrass and Idaho fescue. These species may be replaced by cheatgrass and Kentucky bluegrass along with a variety of annual and perennial forbs including noxious and invasive plants. These fine fuels will increase the fire frequency. Root sprouting shrubs such as rabbitbrush and mountain snowberry may increase.

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 reducing vigor of the bunchgrasses and possibly bitterbrush. With reduced vigor, recruitment of these species declines. As these species decline, the plant community becomes susceptible to an increase in mountain big sagebrush and noxious and invasive plants.

Continued improper grazing management influences fire frequency by increasing fine fuels. As cheatgrass increases, along with 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 mountain big sagebrush. A planned grazing system can be developed to intentionally accumulate fine fuels in preparation for a prescribed burn. Any brush management should be carefully planned as a decrease in shrubs without a suitable understory of perennial grasses will lead to an increase in fine fuels which will result in more frequent fire intervals.

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, particularly bitterbrush from western tent caterpillars (Malacosoma fragilis). Two consecutive years of defoliation by the tent caterpillar can cause mortality in bitterbrush. An outbreak of a particular insect is usually influenced by weather but no specific data for this site is available. 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. Snow mold can reduce the vigor of mountain big sagebrush.

Influence of noxious and invasive plants:

Many of these species add to the fine-fuel component and lead to increased fire frequency.
Many of the annual and perennial invasive species with deep root systems 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 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:

Decreased infiltration and increased runoff occur with the increase in mountain big sagebrush. Desired understory species can be reduced. The increased runoff also causes sheet and rill erosion. This composition change can affect nutrient and water cycles. 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 Rocky Mountain juniper invasion:

In plant communities that are invaded by Rocky Mountain juniper, the species has a competitive advantage for the following reasons:
• Rocky Mountain juniper is very drought tolerant.
• It has the ability to extract soil moisture from a wide range of soil depths.
• Rocky Mountain 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.
• Rocky Mountain 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, Rocky Mountain juniper gains control of energy capture

As Rocky Mountain juniper extracts water, other plants are unable to acquire sufficient water and nutrients to sustain growth and reproduction, thus reducing cover and biomass in the interspaces. After the canopy closes, there is sufficient soil moisture available for shallow-rooted, shade tolerant species to persist directly under the tree.

The following hydrologic impacts occur on sites invaded by Rocky Mountain 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 Rocky Mountain juniper cover and density results in greater plant and soil disturbance between the canopies.

In summary, a closed Rocky Mountain 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 Rocky Mountain juniper canopy always results in a transition across the threshold to a different state. Generally, when Rocky Mountain juniper canopy cover nears 20%, the plant community is approaching the threshold.

Plant Community and Sequence:

Transition pathways between common vegetation states and phases:

State 1.
Phase A to B. Develops in the absence of fire. No Rocky Mountain juniper seed source in the proximity.
Phase A to C. Usually results from improper grazing management and absence of fire. A Rocky Mountain juniper

seed source is present.
Phase A to D. Results from one or more fires.
Phase A to E. Results from improper grazing management and absence of fire. No Rocky Mountain juniper seed source is present.
Phase B to A. Results from prescribed grazing management.
Phase C to A. Develops with prescribed grazing management and prescribed burning or fire.
Phase D to A. Usually results from no fire and prescribed grazing management.
Phase E to A. Develops from prescribed grazing management and accelerates with prescribed burning or brush management.
Phase B to D. This develops from prescribed burning or fire.
Phase C to D. This develops from prescribed burning or fire.
Phase E to D. Results from prescribed burning or fire.

State 1 Phase D to State 2, Phase B. Develops through improper grazing management and lack of fire. This site has crossed the threshold. It is usually uneconomical to return this community to State1 through accelerated practices.

State 1 Phase E to State 2 Phase A. Develops through improper grazing management with no fire. This site has crossed the threshold. It is usually uneconomical to return this community to State1 through accelerated practices.

State 1 Phase C to State 3. Results from improper grazing management and lack of fire. This site has crossed the threshold. It is usually uneconomical to return this community to State1 through accelerated practices.

State 2 Phase A to State 2 Phase B. Results from improper grazing management and fire. The site has crossed the threshold. It is usually uneconomical to return this community to State1 through accelerated practices.

State 2 Phase B to State 2 Phase A. Results from no fire. The site has crossed the threshold. It is usually uneconomical to return this community to State1 through accelerated practices.

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

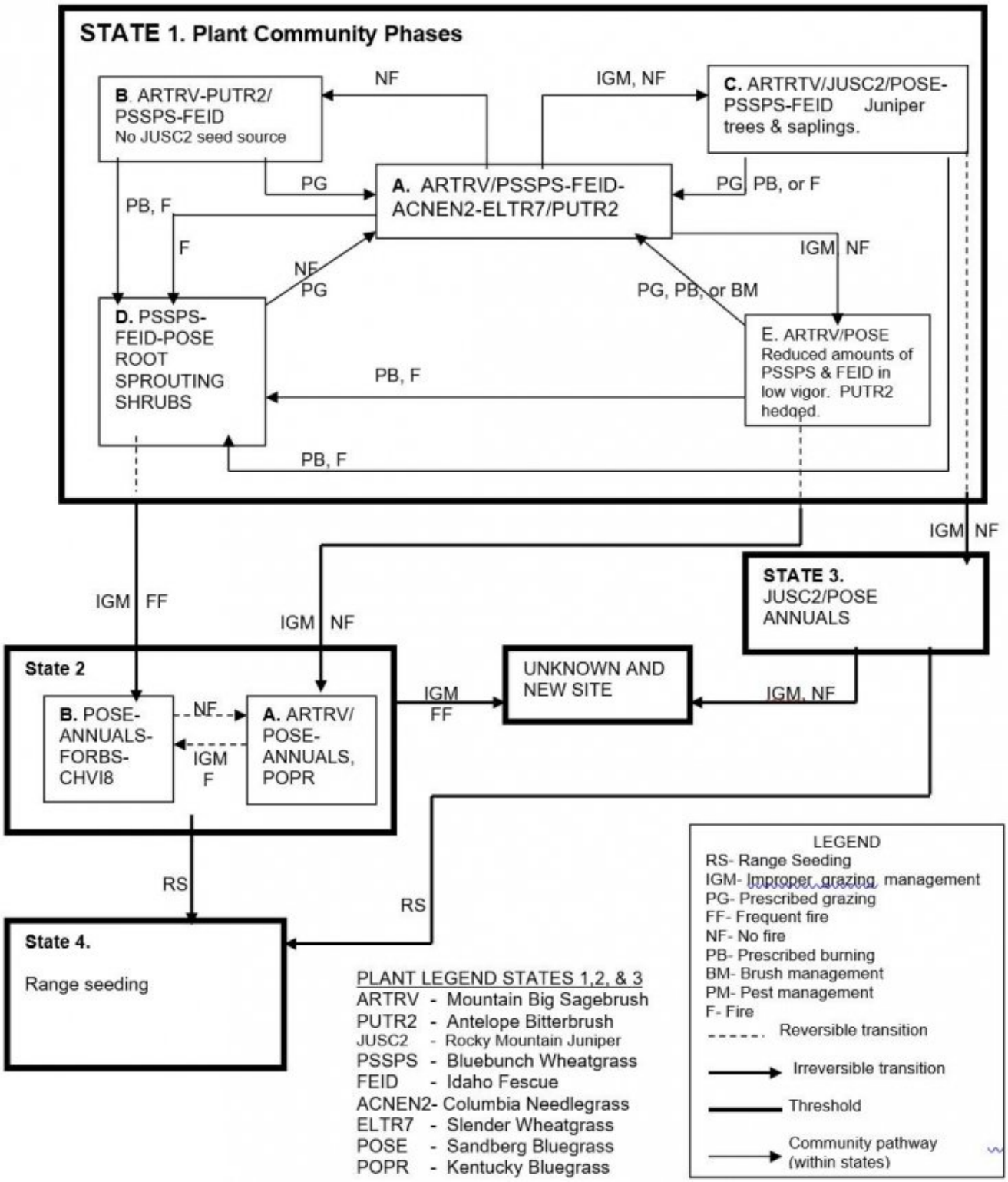
State 3 to unknown site. Continued improper grazing management and lack of fire cause this state to cross the threshold and retrogress to a new site with reduced potential due to significant soil loss and changes in hydrology. It is usually uneconomical to return this community to State1 through accelerated practices.

State 2 to State 4 or State 3 to State 4. It is seeded to adapted improved species or native species that attempt to mimic the native plant community.

Practice Limitations.

Only slight limitations exist on this site for seeding and brush management.

State and transition model



State 1
State 1 Phase A

Community 1.1
State 1 Phase A

Reference Plant Community Phase. This plant community has mountain big sagebrush in the overstory with bluebunch wheatgrass and Idaho fescue in the understory. Antelope bitterbrush can occur in the plant community. Subdominant species include prairie junegrass, Columbia needlegrass, Letterman’s needlegrass, big bluegrass, slender wheatgrass, and arrowleaf balsamroot. There can be a variety of other grasses, forbs, and shrubs in minor amounts. Natural fire frequency is 20-35 years.

Table 5. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	0%
Grass/grasslike foliar cover	0%
Forb foliar cover	0%
Non-vascular plants	0%
Biological crusts	0%
Litter	60-80%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0%

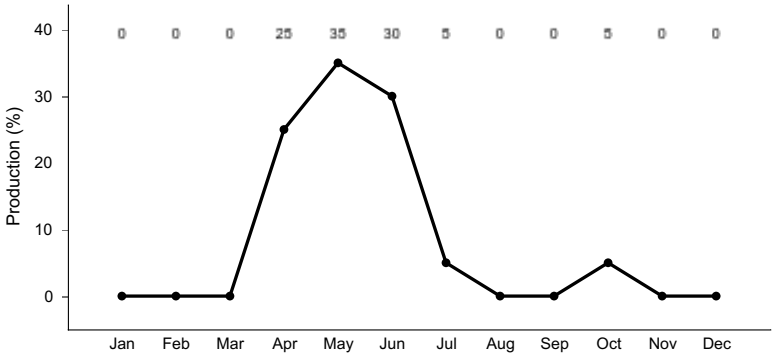


Figure 3. Plant community growth curve (percent production by month). ID0805, B13 ARTRV . State 1.

Community 1.2
State 1 Phase B

State 1, Phase B. This plant community is dominated in the overstory by mountain big sagebrush and bitterbrush. Antelope bitterbrush is usually decadent. Bluebunch wheatgrass and Idaho fescue are the dominant species in the understory. Subdominant species include prairie junegrass, Columbia needlegrass, Letterman’s needlegrass, big bluegrass, slender wheatgrass and arrowleaf balsamroot. No Rocky Mountain juniper seed source is present. This state has developed due to fire frequency being much longer than normal.

Community 1.3
State 1 Phase C

State 1, Phase C. This plant community is dominated by mountain big sagebrush in the overstory with juniper trees or saplings. Sandberg bluegrass is the dominant grass in the understory. Bluebunch wheatgrass and Idaho fescue are present but in reduced amounts and typically in low vigor. Antelope bitterbrush is decadent and hedged. This state has developed due to improper grazing management and lack of fire. A juniper seed source is in the proximity.

Community 1.4
State 1 Phase D

State 1, Phase D. This plant community is dominated by bluebunch wheatgrass. Idaho fescue has low vigor. Sandberg bluegrass and other perennial grasses and forbs are subdominant. Root-sprouting shrubs such as rabbitbrush, snowberry and three-tip sagebrush may be present. This plant community is a result of fire.

Community 1.5

State 1 Phase E

State 1, Phase E. This plant community is dominated by mountain big sagebrush in the overstory. Sandberg bluegrass is the dominant grass in the understory. Bluebunch wheatgrass and Idaho fescue are present but in reduced amounts and typically in low vigor. Antelope bitterbrush is hedged. This state has developed due to improper grazing management and a lack of fire. No juniper seed source is in the proximity.

Pathway A to B
Community 1.1 to 1.2

Phase A to B. Develops in the absence of fire. No Rocky Mountain juniper seed source in the proximity.

Pathway A to C
Community 1.1 to 1.3

Phase A to C. Usually results from improper grazing management and absence of fire. A Rocky Mountain juniper seed source is present.

Pathway A to D
Community 1.1 to 1.4

Phase A to D. Results from one or more fires.

Pathway A to E
Community 1.1 to 1.5

Phase A to E. Results from improper grazing management and absence of fire. No Rocky Mountain juniper seed source is present.

Pathway B to A
Community 1.2 to 1.1

Phase B to A. Results from prescribed grazing management.

Pathway B to D
Community 1.2 to 1.4

Phase B to D. This develops from prescribed burning or fire

Pathway C to A
Community 1.3 to 1.1

Phase C to A. Develops with prescribed grazing management and prescribed burning or fire

Pathway C to D
Community 1.3 to 1.4

Phase C to D. This develops from prescribed burning or fire

Pathway D to A
Community 1.4 to 1.1

Phase D to A. Usually results from no fire and prescribed grazing management

Pathway E to A
Community 1.5 to 1.1

Phase E to A. Develops from prescribed grazing management and accelerates with prescribed burning or brush management

Pathway E to D
Community 1.5 to 1.4

Phase E to D. Results from prescribed burning or fire.

State 2
State 2

Community 2.1
State 2 Phase A

State 2, Phase A. This plant community is dominated by mountain big sagebrush with Sandberg bluegrass and annuals in the interspaces. Kentucky bluegrass has invaded the plant community. This state has developed due to improper grazing management and the absence of fire from Phase E, State 1 or with no fire from Phase B, State 2. This site has crossed the threshold. It is usually uneconomical to return this community to State1 through accelerated practices.

Community 2.2
State 1 Phase B

State 2, Phase B. This plant community is dominated by Sandberg bluegrass and other annuals and forbs. Root sprouting shrubs such as rabbitbrush, three-tip sagebrush and snowberry are present. Some soil loss has occurred. This state has developed due to improper grazing management and frequent fire from Phase D, State 1 or with improper grazing management and fire from Phase A, State 2. This site has crossed the threshold. It is usually uneconomical to return this community to State 1 through accelerated practices.

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	0%
Grass/grasslike foliar cover	0%
Forb foliar cover	0%
Non-vascular plants	0%
Biological crusts	0%
Litter	60-80%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0%

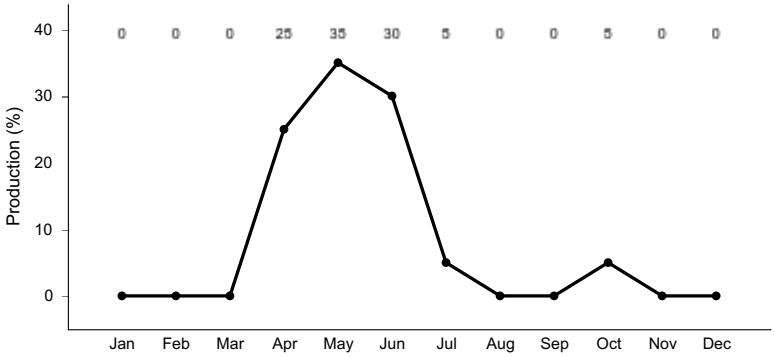


Figure 4. Plant community growth curve (percent production by month). ID0805, B13 ARTRV . State 1.

Pathway A to B
Community 2.1 to 2.2

Results from improper grazing management and fire. The site has crossed the threshold. It is usually uneconomical to return this community to State1 through accelerated practices.

Pathway B to A
Community 2.2 to 2.1

Results from no fire. The site has crossed the threshold. It is usually uneconomical to return this community to State1 through accelerated practices

State 3
State 3

State 3. This plant community is dominated by Rocky Mountain juniper. Remnants of Bluebunch wheatgrass and Idaho fescue can be found in the understory, often under trees. Shallow-rooted grasses, such as Sandberg bluegrass, and other annuals can be found in the interspaces. Few shrubs are present. Some soil loss has occurred. This state has developed with improper grazing management and in the absence of fire. Generally, when shrub cover is below 10-15%, bare ground is above 25-30%, juniper cover is greater than 20%, the site has crossed the threshold. It is usually uneconomical to return this community to State 1 through accelerated practices.

Community 3.1
State 1 Phase C

This plant community is dominated by mountain big sagebrush in the overstory with juniper trees or saplings. Sandberg bluegrass is the dominant grass in the understory. Bluebunch wheatgrass and Idaho fescue are present but in reduced amounts and typically in low vigor. Antelope bitterbrush is decadent and hedged. This state has developed due to improper grazing management and lack of fire. A juniper seed source is in the proximity.

Table 7. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	0%
Grass/grasslike foliar cover	0%
Forb foliar cover	0%
Non-vascular plants	0%
Biological crusts	0%
Litter	60-80%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%

Bedrock	0%
Water	0%
Bare ground	0%

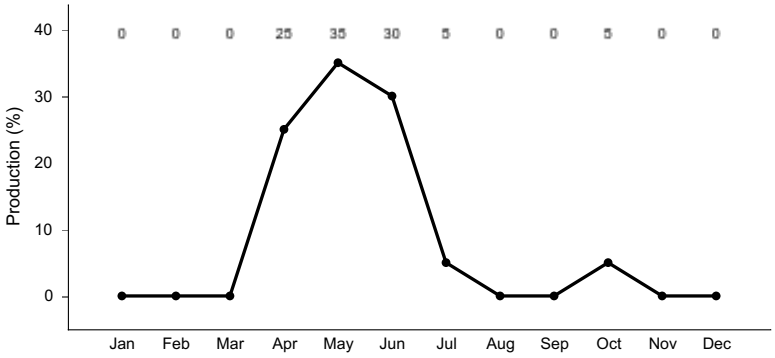


Figure 5. Plant community growth curve (percent production by month). ID0805, B13 ARTRV . State 1.

State 4
State 4

State 4. This state is a range seeding. It is seeded to adapted improved species or native species that attempt to mimic the native plant community.

Community 4.1
State 1 Phase D

This plant community is dominated by bluebunch wheatgrass. Idaho fescue has low vigor. Sandberg bluegrass and other perennial grasses and forbs are subdominant. Root-sprouting shrubs such as rabbitbrush, snowberry and three-tip sagebrush may be present. This plant community is a result of fire.

Table 8. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	0%
Grass/grasslike foliar cover	0%
Forb foliar cover	0%
Non-vascular plants	0%
Biological crusts	0%
Litter	60-80%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0%

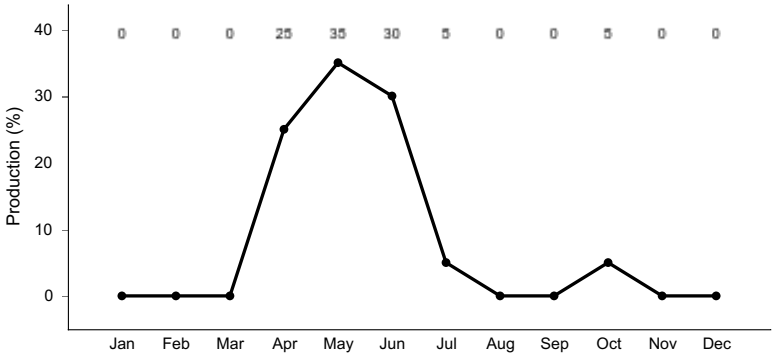


Figure 6. Plant community growth curve (percent production by month). ID0805, B13 ARTRV . State 1.

State 5
State 5

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 frequent fires from State 2 or with continued improper grazing management and the absence of fire from a Rocky Mountain juniper invaded Phase from State 3. This site will not return to State 1 or 2 because of significant soil loss.

Community 5.1
State 1 Phase E

This plant community is dominated by mountain big sagebrush in the overstory. Sandberg bluegrass is the dominant grass in the understory. Bluebunch wheatgrass and Idaho fescue are present but in reduced amounts and typically in low vigor. Antelope bitterbrush is hedged. This state has developed due to improper grazing management and a lack of fire. No juniper seed source is in the proximity.

Table 9. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	0%
Grass/grasslike foliar cover	0%
Forb foliar cover	0%
Non-vascular plants	0%
Biological crusts	0%
Litter	60-80%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0%

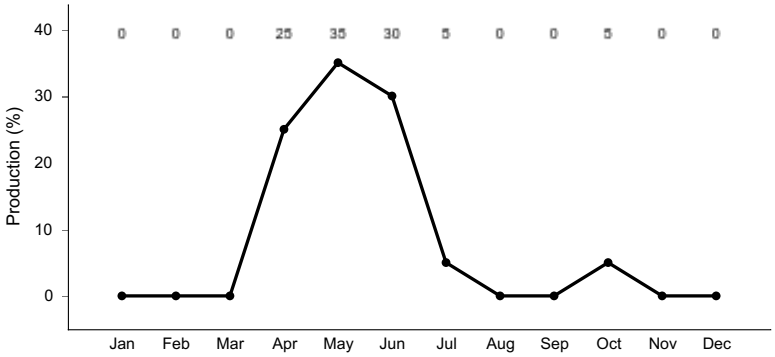


Figure 7. Plant community growth curve (percent production by month). ID0805, B13 ARTRV . State 1.

Transition T1A
State 1 to 2

State 1 Phase D to State 2, Phase B. Develops through improper grazing management and lack of fire. This site has crossed the threshold. It is usually uneconomical to return this community to State1 through accelerated practices. State 1 Phase E to State 2 Phase A. Develops through improper grazing management with no fire. This site has crossed the threshold. It is usually uneconomical to return this community to State1 through accelerated practices.

Transition T1B
State 1 to 3

State 1 Phase C to State 3. Results from improper grazing management and lack of fire. This site has crossed the threshold. It is usually uneconomical to return this community to State1 through accelerated practices.

Transition T2A
State 2 to 4

It is seeded to adapted improved species or native species that attempt to mimic the native plant community.

Transition T2B
State 2 to 5

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

Transition T3A
State 3 to 4

It is seeded to adapted improved species or native species that attempt to mimic the native plant community.

Transition T3B
State 3 to 5

State 3 to unknown site. Continued improper grazing management and lack of fire 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 usually uneconomical to return this community to State1 through accelerated practices.

Additional community tables

Animal community

Wildlife Interpretations.

Animal Community – Wildlife Interpretations

This rangeland ecological site provides diverse habitat for many native wildlife species. The plant community exhibits a diverse mixture of forbs throughout the growing season offering excellent habitat for invertebrates. Mule deer, pronghorn antelope, and elk may utilize the site at different times of the year. The site provides seasonal habitat for resident and migratory animals including western toad, shrews, bats, ground squirrels, mice, coyote, red fox, badger, Ferruginous hawk, and prairie falcon. Area sensitive bird species include Brewer's sparrow, sage thrasher, sage sparrow, and sage-grouse. Water features are sparse provided by seasonal runoff, artificial water catchments, and springs.

State 1 Phase 1.1 – Mountain Big Sagebrush/ Bluebunch Wheatgrass/ Idaho Fescue/ Columbia Needlegrass/ Slender Wheatgrass/ 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. The reptile and amphibian community is represented by common sagebrush lizard, western rattlesnake, Great Basin spadefoot toad, western toad, and northern leopard frog. Amphibians are associated with springs and isolated water bodies adjacent to this plant community. Development of spring sites that collect all available water would exclude amphibian use on these sites. Native shrub-steppe obligate avian species utilizing the habitat include the Brewer's sparrow, sage sparrow, sage grouse, and sage thrasher. Sage-grouse habitat (leks, nesting, brood-rearing, and winter) is provided by this plant community. The plant community provides seasonal food and cover for large mammals including mule deer, pronghorn antelope, and elk. Antelope bitterbrush, bluebunch wheatgrass, and Idaho fescue are important forage species for these animals. Some areas may provide winter food for mule deer and pronghorn antelope. A diverse small mammal population including golden-mantled ground squirrels, jackrabbits, deer mice, and Great Basin pocket mice may utilize this plant community. The deer mouse is beneficial to this site as it is the principal vector for planting bitterbrush seed.

State 1 Phase 1.2- Mountain Big Sagebrush/ Antelope Bitterbrush/ Bluebunch Wheatgrass/ Idaho Fescue Plant Community: This phase has developed due to fire interval being much longer than normal. An increase in canopy cover of sagebrush and antelope bitterbrush contributes to a declining herbaceous understory. The reptile community will be similar to the State 1 Phase 1.1 community represented by common sagebrush lizard and western rattlesnake. Sagebrush provides brood-rearing, winter cover, and winter food habitat for sage-grouse but as understory vegetation declines the quality of this habitat is reduced. The plant community supports spring and fall forage for mule deer, elk, and pronghorn. Quality of winter food habitat for mule deer and pronghorn is similar to that in State 1 Phase 1.1. A diverse small mammal population including golden-mantled ground squirrels, jackrabbits, deer mice, and Great Basin pocket mice may utilize this plant community.

State 1 Phase 1.3 – Mountain Big Sagebrush/ Antelope Bitterbrush/ Bluebunch Wheatgrass/ Idaho Fescue/ Rocky Mountain Juniper Plant Community: This plant community is the result of improper grazing management and no fire. An increase in canopy cover of sagebrush and juniper contributes to a sparse herbaceous understory. A reduced herbaceous understory results in lower diversity and numbers of insects. The reptile community will be similar to the State 1 Phase 1.1 community. 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 sagebrush provides brood-rearing, winter cover, and winter food habitat for sage-grouse but as juniper encroaches the quality of this habitat is severely reduced or eliminated. The plant community supports limited spring and fall food for mule deer, elk, and pronghorn antelope due to the loss of understory vegetation. Juniper can provide winter habitat (cover and food) for mule deer. As juniper encroaches the site will provide additional thermal cover for large mammals. A diverse small mammal population including golden-mantled ground squirrels, jackrabbits, deer mice, and Great Basin pocket mice may utilize this plant community.

State 1 Phase 1.4 – Bluebunch Wheatgrass/ Idaho Fescue / Sandberg Bluegrass Plant Community: This plant community is a result of recent wildfire, prescribed burning, or brush management. The plant community, dominated by herbaceous vegetation with little to no sagebrush or antelope bitterbrush would provide less vertical structure for animals. Patches of root sprouting shrubs (snowberry and rabbitbrushes) may be present to provide limited vertical structure for wildlife. Insect diversity would be reduced but a native forb plant community similar to State 1 Phase 1.1 would still support select pollinators. Habitat for reptiles would be limited or excluded 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 the use of amphibians on these sites. The dominance of herbaceous

vegetation with little sagebrush and antelope bitterbrush canopy cover would limit use of these areas as nesting habitat by Brewer's sparrow, sage sparrow, sage grouse, and sage thrasher. The dominant herbaceous vegetation improves habitat for grassland avian species (horned lark, savannah sparrow, vesper sparrow, and western meadowlark). Sharp-tailed grouse would prefer this plant community over sites with dense sagebrush canopy cover. Mule deer, pronghorn, and elk use would be seasonal (spring, summer, and fall) and offer little thermal and young of year cover due to the loss of shrub cover. The populations of small mammals would be dominated by open grassland species. Large blocks of this plant community would fragment the reference plant community and reduce the quality of habitat for shrub-steppe obligate animal species.

State 1 Phase 1.5 – Mountain Big Sagebrush / Sandberg Bluegrass/ Plant Community: This plant community is the result of improper grazing management and a lack of fire. An increase in canopy cover of sagebrush contributes to a sparse herbaceous understory. Grasses, forbs, and shrubs are used by native insects that assist in pollination. The reptile and amphibian community is represented by common sagebrush lizard, western rattlesnake, Great Basin spadefoot toad, western toad, and northern leopard frog. Key shrub-steppe obligate avians include Brewer's sparrow, sage sparrow, sage thrasher, and sage-grouse. Quality of habitat (brood-rearing and nesting cover) for sage-grouse is reduced due to a less diverse herbaceous plant community. Winter habitat (cover and food) for sage-grouse is provided. The reduced vigor of understory vegetation provides a shorter forage season for mule deer, elk, and pronghorn antelope. Young of year cover would be provided for deer and pronghorn antelope. Small mammal diversity and populations would be similar to that in State 1 Phase 1.1.

State 2 Phase 2.1 – Mountain Big Sagebrush/ Sandberg Bluegrass/ Annuals/ Kentucky 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 reduction of Idaho fescue and bluebunch wheatgrass. The reduced diversity of herbaceous understory results in lower diversity of insects. The reptile and amphibian community is represented by common sagebrush lizard, western rattlesnake, Great Basin spadefoot toad, western toad, and northern leopard frog. The reduced diversity of insects may reduce reptile diversity and populations. Reduced herbaceous understory may lower the quality of habitat for bird species. Shrub-steppe obligate avian species include Brewer's sparrow, sage sparrow, sage thrasher, and sage-grouse. Quality of habitat (brood-rearing and nesting cover) for sage-grouse is reduced due to poor vigor and less diverse herbaceous plant community. Winter habitat (cover and food) for sage-grouse is provided. If managed properly, Kentucky bluegrass will provide excellent forage for elk and deer. Young of year cover would be provided for deer and pronghorn antelope. Small mammal diversity and populations would be similar to those in State 1 Phase 1.1.

State 2 Phase 2.2 – Sandberg/ Annuals/ Forbs/ Green Rabbitbrush Plant Community: This phase has developed due to improper grazing management and frequent fire from Phase 1.4, State 1 or with improper grazing management and fire from Phase 2.1, State 2. The reduced forb and shrub components in the plant community would support a very limited population of pollinators. Habitat for common sagebrush lizard, Great Basin spadefoot toad, and western toad would be limited due to the loss of sagebrush. The loss of sagebrush and antelope bitterbrush would severely reduce the quality of habitat for sage thrasher, Brewer's sparrow, sage-grouse, and sage sparrow. Birds of prey including hawks and falcons may range throughout these areas looking for prey species. Large mammals may utilize the herbaceous vegetation in the early part of the year when the vegetation is more palatable. The populations of small mammals would be dominated by open grassland species. Predator hunting success may increase due to decreased cover for small mammals. Large blocks of this plant community would fragment the reference plant community and reduce the quality of habitat for shrub-steppe obligate animal species.

State 3 – Rocky Mountain Juniper/ Sandberg Bluegrass/ Annuals Plant Community: This state has developed due to improper grazing management and no fire. The loss of native forbs and understory vegetation will reduce insect diversity on the site. The lack of flowering plants reduces use by pollinators like butterflies and moths. Habitat for common sagebrush lizard, Great Basin spadefoot toad, and western toad would be limited due to the loss of sagebrush. This plant community does not support the habitat requirements for sage-grouse. Birds using this site as resident or migratory habitat include Juniper titmouse, western bluebird, and Virginia's warbler. The Juniper titmouse relies heavily on juniper seeds for winter food. Hunting success by raptors may decrease due to a heavy overstory of juniper. As juniper encroaches the site will provide additional thermal cover for large mammals. The plant community provides food and cover for mule deer.

State 4 – Rangeland Seeding Plant Community: The seeding mixture (native or non-native) determines the animal species that utilize this site. A diverse seed mixture of grasses and forbs would provide similar habitat conditions as in the herbaceous plant community described in State 1 phase 1.4. A diverse seed mixture of grasses, forbs, and

shrubs would provide similar habitat conditions as described in State 1 phase 1.1, 1.2 or 1.3. A monoculture of non-native grass species would not support diverse populations of insects, reptiles, avians, mammals, or shrub-steppe obligate animal species. Grassland animal species including western meadowlark, horned lark, savannah sparrow, deer mouse, kangaroo rat, mule deer, and elk would utilize this site for nesting and/or foraging. Birds of prey including hawks and falcons may range throughout this community looking for prey species. Large areas of State 4 with no shrubs in the plant community would fragment the reference plant community and would severely reduce the quality of habitat for shrub-steppe obligate animal species.

Grazing Interpretations.

This site is well suited for livestock use in the summer and fall.
Estimated initial stocking rate will be determined with the landowner or decision-maker. They will be based on the inventory which includes species, composition, similarity index, production, past use history, season of use, and seasonal preference. Calculations used to determine estimated initial stocking rate will be based on forage preference ratings.

Hydrological functions

Soils on this site are in hydrologic group B. Due to the gentle topography, infiltration is normally high and runoff low. Runoff, when it does occur is non-erosive except during high intensity convection storms. Snow accumulates on the site due to high elevation and presence of tall shrubs.

Recreational uses

This site is well suited for recreation use in the summer and fall.

Wood products

none.

Other products

none.

Other information

Field Offices

American Falls, ID
Blackfoot, ID
Burley, ID
Driggs, ID
Fort Hall, ID
Idaho Falls, ID
Malad, ID
Pocatello, ID
Rexburg, ID
Soda Springs, ID
St. Anthony, ID

Revision Notes: “Previously Approved” Provisional
This Provisional ecological site concept has passed Quality Control (QC) and Quality Assurance (QA) to ensure that the site meets the 2014 NESH standards for a Provisional ecological site description. This is an updated “Previously Approved” ESD that represents a first-generation tier of documentation that, prior to the release of the 2014 National Ecological Site Handbook (NESH),

met all requirements as an “Approved” ESD as laid out in the 1997 (rev.1, 2003) National Range and Pasture Handbook (NRPH). The document fully described the Reference State and Community Phase in the State-and-Transition model. All other alternative states are at least described in narrative form. The “Previously Approved” ESD has been field-tested for a minimum of five years and is a proven functional document for conservation planning. The “Previously Approved” ESD does not contain all tabular and narrative entries as required in the current “Approved” level of documentation, but it is expected that the “Previously Approved” ESD will continue refinement toward an “Approved” status.

Site Development and Testing Plan:
Future work, as described in a Project Plan, is necessary to validate the information in this Provisional Ecological Site Description. This will include field activities to collect low-, medium-, and high-intensity sampling, soil correlations, and analysis of that data. Annual field reviews should be done by soil scientists and vegetation specialists. The final field review, peer review, quality control, and quality assurance reviews of the ESD will be required to produce the final document.

Inventory data references

Information presented here has been derived from NRCS clipping and other inventory data. Also, field knowledge of range-trained personnel was used. Those involved in developing this site description include:
Dave Franzen, co-owner, Intermountain Rangeland Consultants, LLC
Jacy Gibbs, co-owner, Intermountain Rangeland Consultants, LLC
Jim Cornwell, Range Management Specialist, IASCD
Brendan Brazee, State Rangeland Management Specialist, NRCS, Idaho
Lee Brooks, Range Management Specialist, IASCD
Kristen May, Resource Soil Scientist, NRCS, Idaho

Type locality

Location 1: Clark County, ID	
General legal description	East of Kilgore.
Location 2: Caribou County, ID	
General legal description	Gentle valley slopes and low foothills, Corral Creek.
Location 3: Bear Lake County, ID	
General legal description	Foothills in the vicinity of Gerogetown Summit.
Location 4: Bear Lake County, ID	
Township/Range/Section	T10S R43E S12
General legal description	Bradley Mountain

Other references

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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.
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.

Contributors

D. Edgerton

Approval

Kendra Moseley, 9/23/2020

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	Dave Franzen and Jacy Gibbs Intermountain Range Consultants 17700 Fargo Rd. Wilder, ID 83676
Contact for lead author	Brendan Brazee, State Rangeland Management Specialist USDA-NRCS 9173 W. Barnes Drive, Suite C, Boise, ID 83709
Date	05/05/2008
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** rills rarely occur on this site. If rills are present they are likely to occur on slopes greater than 15 percent and immediately following wildfire. Rills are most likely to occur on soils with surface textures of silt loam and clay loam.

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

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3. **Number and height of erosional pedestals or terracettes:** both are rare on this site. In areas where slopes approach 15 percent and where flow patterns and/or rills are present, a few pedestals may be expected.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** data is not available. On sites in mid-seral status bare ground may range from 35-50 percent.

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

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

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.

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

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** structure ranges from weak very fine, fine, medium and coarse granular to moderate very fine and fine granular to weak and moderate thin platy to weak and moderate very fine, fine and medium subangular blocky. Soil organic matter (SOM) generally ranges from 1 to 10 percent, in some soil profiles the SOM can range from 60 to 95 percent. Surface color ranges from black to very dark brown to dark brown. The A or A1 horizon is typically 2 to 14 inches thick.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** bunchgrasses, especially deep-rooted perennials, slow run-off and increase infiltration. Tall shrubs accumulate snow in the interspaces.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** not present.

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: perennial forbs

    Other: shrubs

    Additional: shallow rooted bunchgrasses

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** mountain big sagebrush and antelope bitterbrush 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):** additional litter cover data is needed but is expected to be 20-25 percent to a depth of 0.2 inches. Under mature shrubs litter is >0.5 inches deep and is 90-100 percent ground cover.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** is 2000 pounds per acre (2222 kilograms per hectare) in a year with normal temperatures and precipitation. Perennial grasses produce 70-80 percent of the total production, forbs 10-20 percent and shrubs 5-15 percent.

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, Vulpia species, Kentucky bluegrass, yellow salsify, and annual mustards.

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