

Ecological site R010XA037ID Shrubby Stony North 12-16 PZ ARTRV/FEID

Last updated: 12/13/2023
 Accessed: 04/24/2024

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): 010X–Central Rocky and Blue Mountain Foothills

This MLRA is characterized by gently rolling to steep hills, plateaus, and low mountains at the foothills of the Blue Mountains in Oregon and the Central Rocky Mountains in Idaho. The geology of this area is highly varied and ranges from Holocene volcanics to Cretaceous sedimentary rocks. Mollisols are the dominant soil order and the soil climate is typified by mesic or frigid soil temperature regimes, and xeric or aridic soil moisture regimes. Elevation ranges from 1,300 to 6,600 feet (395 to 2,010 meters), increasing from west to east. The climate is characterized by dry summers and snow dominated winters with precipitation averaging 8 to 16 inches (205 to 405 millimeters) and increasing from west to east. These factors support plant communities with shrub-grass associations with considerable acreage of sagebrush grassland. Big sagebrush, bluebunch wheatgrass, and Idaho fescue are the dominant species. Stiff sagebrush, low sagebrush, and Sandberg bluegrass are often dominant on sites with shallow restrictive layers. Western juniper is one of the few common tree species and since European settlement has greatly expanded its extent in Oregon. Nearly half of the MLRA is federally owned and managed by the Bureau of Land Management. Most of the area is used for livestock grazing with areas accessible by irrigation often used for irrigated agriculture.

For further information, see "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, 2006)" available online at: https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/?cid=nrcs142p2_053624

Ecological site concept

- Site occurs on uplands
- Slopes greater than 30% on northerly aspects
- Site is in 12-16 PZ with elevation below 7000 ft
- Soils are extremely bouldery loams. Large boulders are common on the surface.

Associated sites

R010XA004ID	Loamy 12-16 PZ ARTRV/FEID-PSSPS Adjacent low slope areas
R010XA021ID	South Slope Fractured 12-16 PZ Adjacent south slopes
R010XA031ID	Bouldery Loam 12-16 PZ ARTRV/FEID Adjacent low slope areas with significant boulders on or near the surface
R010XA036ID	North Slope Stony 12-16 PZ ARTRX/PSSPS Adjacent north slopes without significant boulders on or near the surface

Similar sites

R010XA036ID	North Slope Stony 12-16 PZ ARTRX/PSSPS No significant boulders on or near the surface
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Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Artemisia tridentata ssp. vaseyana</i>
Herbaceous	(1) <i>Festuca idahoensis</i>

Physiographic features

This site occurs on hilly to very steep north exposures. Slopes range from 12 to 65 percent. Elevations range from 4700 to 5800 feet (1430 to 1770 meters).

Table 2. Representative physiographic features

Landforms	(1) Mountain valleys or canyons > Canyon (2) Foothills > Hill
Flooding frequency	None
Ponding frequency	None
Elevation	4,700–5,800 ft
Slope	12–65%
Water table depth	80 in
Aspect	NW, N, NE

Climatic features

The Big and Little Wood River Foot slopes and Plains, proposed as MLRA 10X, has a mean elevation of 5310 feet above sea level, and varies from 3600 to 9235 feet. In general, average annual precipitation is greatest on the western side, with the southeast area being the driest. The average annual precipitation, based on 7 long term climate stations located throughout the MLRA, is 15.39 inches, with a range of 12.5 to 18 inches. Monthly precipitation is generally greatest at the end of the year, diminishes steadily until a low in July and August, then increases rapidly in the autumn.

Monthly temperatures can vary considerably. Highs of up to 102° and lows down to -52° Fahrenheit have been recorded. The average annual temperature is 42.9°. The frost-free period ranges from 75 to 98 days. The freeze-free period is a bit longer: 106 to 133 days.

Both morning and afternoon average relative humidity values peak in the winter, and reach their low in July and August. 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.

Table 3. Representative climatic features

Frost-free period (characteristic range)	75-98 days
Freeze-free period (characteristic range)	106-133 days
Precipitation total (characteristic range)	12-16 in
Frost-free period (actual range)	
Freeze-free period (actual range)	
Precipitation total (actual range)	12-18 in
Frost-free period (average)	86 days
Freeze-free period (average)	120 days

Precipitation total (average)	16 in
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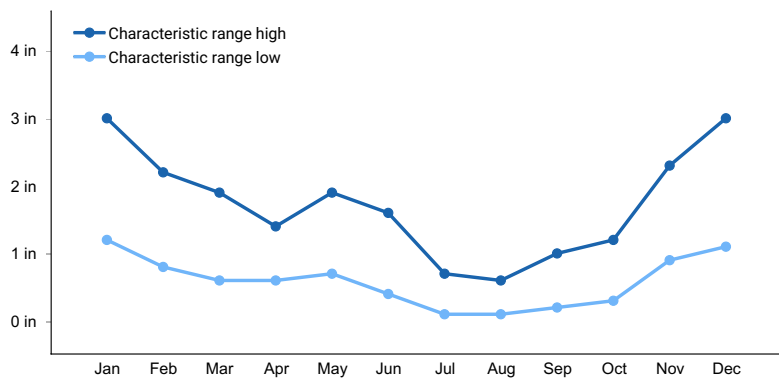


Figure 1. Monthly precipitation range

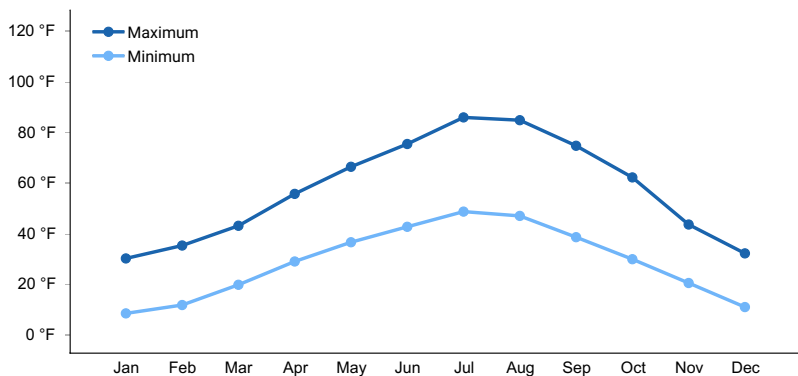


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

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

Wetland description

This site is not influenced by adjacent wetlands.

Soil features

The soils on this site are characterized by extremely bouldery loams. They are well drained, with moderately slow permeability and low available water holding capacity. Runoff is high. The erosion hazard is severe or very severe by water. The surface texture is generally extremely bouldery loam or very stony loam. Large boulders occur on or near the soil surface. These soils are characterized by a xeric moisture regime. Soil temperature regime is frigid.

Soil Series Correlated to this Ecological Site

Moreglade

Table 4. Representative soil features

Parent material	(1) Colluvium–volcanic rock
Surface texture	(1) Very stony loam (2) Extremely bouldery loam
Family particle size	(1) Loamy-skeletal
Drainage class	Well drained
Permeability class	Moderately slow

Soil depth	40–80 in
Surface fragment cover <=3"	9–15%
Surface fragment cover >3"	12–29%
Available water capacity (0-40in)	4 in
Soil reaction (1:1 water) (0-40in)	6.1–7.3
Subsurface fragment volume <=3" (4-60in)	35–50%
Subsurface fragment volume >3" (4-60in)	35–50%

Ecological dynamics

The dominant visual aspect of this site is a wide variety of shrubs. The most prominent shrubs are mountain big sagebrush and antelope bitterbrush. The understory is dominated by Idaho fescue.

Subdominants include bluebunch wheatgrass, bottlebrush squirreltail, western needlegrass, and basin wildrye. The composition by weight is 20 to 40 percent grasses, 5 to 15 percent forbs, and 50 to 70 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, lagomorphs, and small rodents.

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

The Reference State (State 1), previously referred to as the Historic Climax Plant Community (HCPC), 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.

FUNCTION:

This site is best suited for late spring, summer, and fall grazing by livestock. The site can be used by big game in the spring, summer, and fall for food and cover. It is also suited for recreation use in the spring, summer, and fall.

Due to the amount of surface stones and limited access on steeper slopes, most areas of this site are not easily degraded. Lower footslopes in proximity to bottoms or drainages are most likely to degrade due to access by animals from these adjoining lands. Infiltration is good where the plant community has a good shrub component. 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, mountain big sagebrush, antelope bitterbrush, and some other shrubs can gradually increase on the site. Grasses and forbs decrease as shrubs increase. With the continued absence of fire, shrubs can displace most of the primary understory species.

When fires become more frequent than historic levels (20 to 50 years), mountain big sagebrush and bitterbrush are reduced significantly. Rabbitbrush and other root sprouting shrubs can increase slightly. With continued short fire frequency, mountain big sagebrush and bitterbrush can be completely eliminated along with many of the desirable understory species such as Idaho fescue and Thurber's needlegrass. These species may be replaced by Sandberg bluegrass and bulbous bluegrass along with a variety of annual and perennial forbs including noxious and invasive plants. Cheatgrass, bulbous bluegrass, and medusahead 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 reducing vigor of the bunchgrasses. With reduced vigor, recruitment of these species declines. As these species decline, the plant community becomes susceptible to increase in tall shrubs and noxious and invasive plants.

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

Proper grazing management that addresses frequency, duration, and intensity of grazing can also keep fine fuels from developing, thereby reducing fire frequency. This can lead to gradual increases in mountain big sagebrush and tall shrubs. A planned grazing system can be developed to intentionally accumulate fine fuels in preparation for a prescribed burn.

Due to the shrub species on this site, any brush management efforts should be carefully planned. Antelope bitterbrush is very important as a browse species for wildlife and needs to be protected with any brush control practices applied. A reduction in shrubs without a suitable understory of perennial grasses can lead to an increase in fine fuels which will lead to a more frequent fire regime. Loss of antelope bitterbrush on this site can have very negative impacts on wildlife and livestock.

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. Bitterbrush can be severely affected by the western tent caterpillar (*Malacosoma fragilis*). Two consecutive years of defoliation by the tent caterpillar can cause mortality in bitterbrush. 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, 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 year's leader growth. The deer mouse is beneficial to this site as it is the principal vector for planting bitterbrush seed.

Watershed:

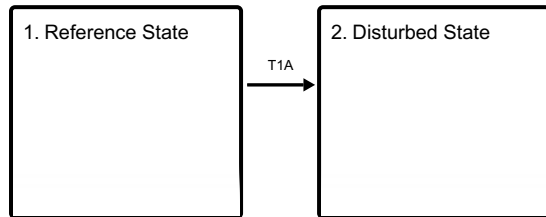
Decreased infiltration and increased runoff occur with an increase in mountain big sagebrush. Desired understory species can be reduced. This composition change can affect nutrient and water cycles. Increased runoff also causes sheet and rill erosion. Abnormally short fire frequency also gives the same results, but to a lesser degree. The long-term effect is a transition to a different state.

Practice Limitations.

Severe limitations exist for brush control and seeding on this site with ground moving equipment due to stoniness and steep slopes.

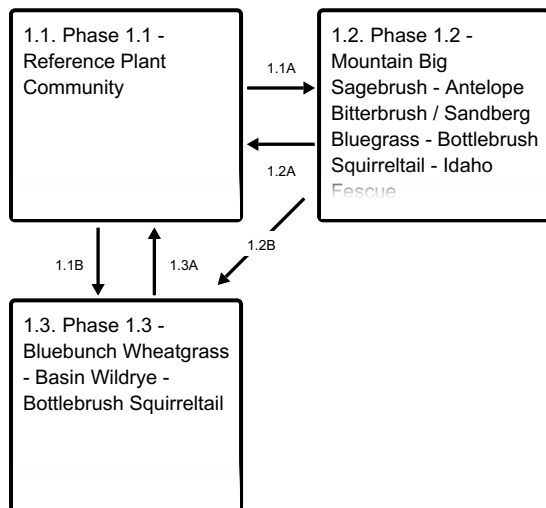
State and transition model

Ecosystem states



T1A - Frequent fire, improper grazing management

State 1 submodel, plant communities



1.1A - Improper grazing management, no fire

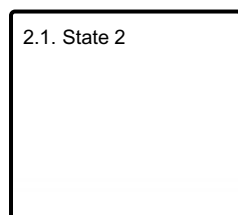
1.1B - Fire

1.2A - Prescribed grazing, brush management

1.2B - Fire

1.3A - Prescribed grazing, no fire

State 2 submodel, plant communities



State 1 Reference State

Dominant plant species

- mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), shrub
- Idaho fescue (*Festuca idahoensis*), grass

Community 1.1

Phase 1.1 - Reference Plant Community

This plant community has mountain big sagebrush and antelope bitterbrush in the overstory with Idaho fescue dominating the understory. Western needlegrass, bluebunch wheatgrass, basin wildrye, buckwheat, and lupine are sub-dominant. A wide variety of other forbs and shrubs can also occur in small amounts. Natural fire frequency is 20 to 50 years.

Resilience management. The Reference Plant Community Phase is Phase 1.1. The plant species composition of Phase 1.1 is listed later under “Reference Plant Community Phase Plant Species Composition”. Total annual production is approximately 775 pounds per acre (860 kilograms per hectare) in a normal year. Production in a favorable year is 950 pounds per acre (1055 kilograms per hectare). Production in an unfavorable year is 650 pounds per acre (720 kilograms per hectare). Structurally tall shrubs are dominant followed by deep rooted perennial grasses being more dominant than perennial forbs while shallow rooted perennial bunchgrasses are subdominant.

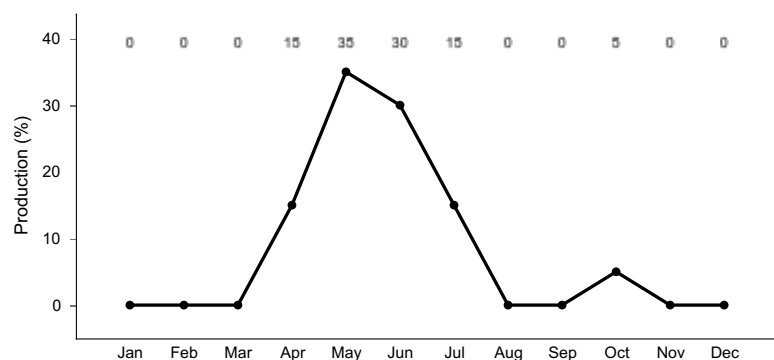


Figure 3. Plant community growth curve (percent production by month). ID0304, D25, ARTRV, NORTH. State 1.

Community 1.2

Phase 1.2 - Mountain Big Sagebrush - Antelope Bitterbrush / Sandberg Bluegrass - Bottlebrush Squirreltail - Idaho Fescue

This plant community is dominated by mountain big sagebrush with reduced amounts of Idaho fescue and other deep-rooted bunchgrasses. Sandberg bluegrass and bottlebrush squirreltail have increased in the understory. All deep-rooted bunchgrasses are typically in low vigor. Mountain big sagebrush has increased as well as some other tall shrubs. Antelope bitterbrush is present but in reduced vigor and may be hedged. This state has developed due to the lack of fire and improper grazing management. Some cheatgrass, bulbous bluegrass, and/or medusahead may have invaded the site.

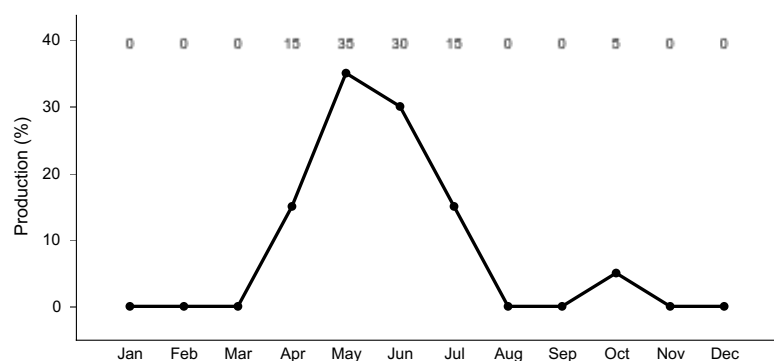


Figure 4. Plant community growth curve (percent production by month). ID0304, D25, ARTRV, NORTH. State 1.

Community 1.3

Phase 1.3 - Bluebunch Wheatgrass - Basin Wildrye - Bottlebrush Squirreltail

This plant community is dominated by bluebunch wheatgrass with some basin wildrye and tall root-sprouting shrubs. Idaho fescue can be lost due to fire. Bottlebrush squirreltail has increased. Forbs remain about in the same proportion as Phase 1.1. Mountain big sagebrush and antelope bitterbrush have been reduced significantly due to wildfire. Some cheatgrass, bulbous bluegrass and/or medusahead may have invaded the site. This plant community is the result of wildfire.

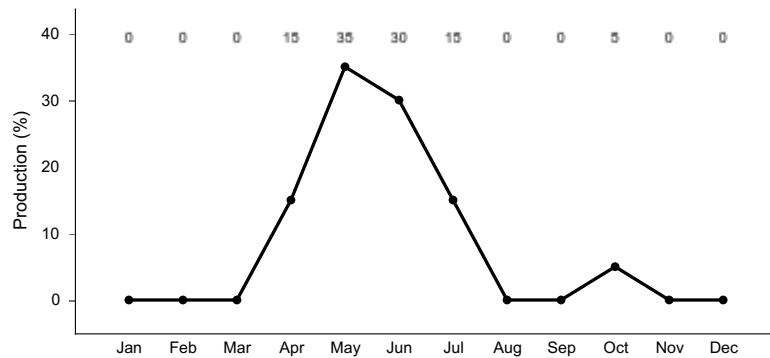


Figure 5. Plant community growth curve (percent production by month). ID0304, D25, ARTRV, NORTH. State 1.

Pathway 1.1A

Community 1.1 to 1.2

Phase 1.1 to 1.2. Develops with improper grazing management and in the absence of fire.

Pathway 1.1B

Community 1.1 to 1.3

Phase 1.1 to 1.3. Develops with fire.

Pathway 1.2A

Community 1.2 to 1.1

Phase 1.2 to 1.1. Develops with prescribed grazing and brush management.

Pathway 1.2B

Community 1.2 to 1.3

Phase 1.2 to 1.3. Develops with fire.

Pathway 1.3A

Community 1.3 to 1.1

Phase 1.3 to 1.1. Develops with prescribed grazing and no fire.

State 2

Disturbed State

Dominant plant species

- Sandberg bluegrass (*Poa secunda*), grass
- bulbous bluegrass (*Poa bulbosa*), grass
- cheatgrass (*Bromus tectorum*), grass

Community 2.1

State 2

This plant community is dominated by Sandberg bluegrass, cheatgrass, bulbous bluegrass and /or other annuals. Root sprouting shrubs such as rabbitbrush and horsebrush can be present, dependent upon, how frequent, fire has occurred. Significant soil loss has occurred. This state has developed due to frequent fires and improper grazing management from Phase B, State 1 or with frequent fires and/or improper grazing management from Phase C, State 1. This site has crossed the threshold. It is economically impractical to return this plant community to State 1 with accelerating practices.

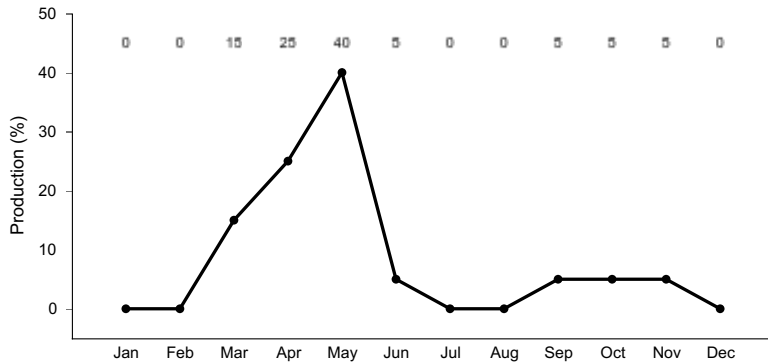


Figure 6. Plant community growth curve (percent production by month). ID0311, POSE/BRTE-ANNUALS . State 2.

Transition T1A State 1 to 2

State 1 Phase 1.2 to State 2. Develops through frequent fire and improper grazing management. State 1 Phase 1.3 to State 2. Develops through frequent fire and/or improper grazing management. This site has crossed the threshold. 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 many native wildlife species. The stony steep slopes with a north exposure limit available forage and cover for large and small animals. Large herbivore use of this ecological site 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 species become rare including sage-grouse, brewer's sparrow and sage thrasher. Encroachment of noxious and invasive plant species (cheatgrass, Medusahead and bulbous bluegrass) can replace native plant species which provide critical feed, brood-rearing and nesting cover for a variety of native wildlife. The loss of herbaceous 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, being provided only by seasonal runoff, artificial water catchments and spring sites. 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 Cave Obligate Harvestman.

State 1 Phase 1.1 – Mountain Big Sagebrush/ Antelope Bitterbrush/ Idaho Fescue / Bluebunch Wheatgrass Reference Plant Community (RPC): This plant community provides a diversity of grasses, forbs and shrubs used by native insect communities that assist in pollination. 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. Spring developments that capture all available water would preclude the use of these sites by

amphibians. The plant community provides habitat for prey species and cover for these resident reptile and amphibian species. Shrub-steppe obligate avian species include the Brewer's sparrow, sage sparrow, sage thrasher and sage-grouse. Critical habitat (brood-rearing) for sage-grouse is provided by this diverse plant community. The plant community supports seasonal needs of large mammals (mule deer and elk) providing food and cover. Antelope bitterbrush is preferred browse for wild ungulates. The deer mouse is the primary vector for planting bitterbrush. A diverse small mammal population including golden-mantled ground squirrels, chipmunks and yellow-bellied marmots utilize this plant community.

State 1 Phase 1.2 – Mountain Big Sagebrush/Sandberg Bluegrass/ Bottlebrush Squirreltail 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 sparse herbaceous understory. Grasses, forbs and shrubs, are used by native insects that assist in pollination but the reduced herbaceous understory results in decreased diversity and numbers of insects. The reptile community is represented by leopard lizard, short horned lizard, sagebrush lizard, western skink and western rattlesnake. Diversity and population of the reptile community would decline due to a reduced understory and associated loss of invertebrate habitat. Spring developments that capture all available water would preclude the use of these sites by amphibians. Key shrub-steppe avian obligate species include Brewer's sparrow, sage sparrow, sage thrasher and sage-grouse. Reduced herbaceous understory is a key factor in limiting the use of this plant community by avian species. Critical habitat (brood-rearing) for sage-grouse is limited due to a less diverse herbaceous plant community. The plant community supports the needs of large mammals (mule deer and elk) providing food and cover on a seasonal basis. Antelope bitterbrush is preferred browse for wild ungulates. The reduced vigor and hedging on antelope bitterbrush will reduce available forage on this site. The deer mouse is the primary vector for planting bitterbrush seed. A diverse small mammal population including golden-mantled ground squirrels, chipmunks, deer mouse and yellow-bellied marmots would utilize the available habitat.

State 1 Phase 1.3 - Bluebunch Wheatgrass/ Basin Wildrye/ Bottlebrush Squirreltail 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 reduced sagebrush canopy cover would eliminate use of these areas for nesting by Brewer's sparrow, sage sparrow and sage thrasher. This plant community provides limited brood-rearing habitat for sage-grouse when sagebrush cover is adjacent to the site. The herbaceous vegetation improves habitat for grassland avian species (horned lark and western meadowlark). Large mammal (mule deer and elk) forage use would be seasonal but the site would offer little thermal cover and young of year cover. The populations of small mammals would be dominated by open grassland species like the Columbian ground squirrel.

State 2 – Sandberg Bluegrass/ Cheatgrass/ Bulbous Bluegrass Annual Plant Community: This plant community is the result of continued improper grazing management and/or frequent fire. The loss of the native shrub and herbaceous plant community would not support a diverse insect community. 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. 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. The reduction of insect populations and diversity would reduce suitability of the site for bats. The populations of small mammals would be dominated by open grassland species like the Columbian ground squirrel.

Grazing Interpretations.

The site is best used by livestock in the late spring, summer, and fall. The steep slopes and surface stones limit some access 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

No data

Recreational uses

This site has limited opportunities for hiking and horseback riding due to steep slopes and surface stones. The site has many forbs for spring flowering photography. There are some opportunities for big game and upland bird hunting.

Wood products

None

Other products

None

Other information

Field Offices

Mountain Home, ID

Gooding, ID

Shoshone, ID

Rupert, ID

Arco, 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

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Lee Brooks, Range Management Specialist, IASCD

Type locality

Location 1: Gooding County, ID	
Township/Range/Section	T3S R14E S9

References

. Fire Effects Information System. <http://www.fs.fed.us/database/feis/>.

Other references

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USDA, NRCS.2001. The PLANTS Database, Version 3.1 (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA

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

Dave Franzen and Jacy Gibbs

Approval

Kirt Walstad, 12/13/2023

Rangeland health reference sheet

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

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Date	03/28/2008
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

- Number and extent of rills:** rills can occur on this site. If rills are present they are likely to occur immediately following wildfire. Rills are most likely to occur on soils with surface textures of silt loam and clay loam.

- Presence of water flow patterns:** water-flow patterns occur on the site. They occur as short and disrupted flows. They are disrupted by rocks, cool season grasses and tall shrubs and are not extensive.

- Number and height of erosional pedestals or terracettes:** both are rare on this site. Where flow patterns and/or rills are present, a few pedestals may be expected. Terracettes can occur as deposits behind rocks, large bunchgrasses, and shrubs.

- 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 20-30 percent.

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5. **Number of gullies and erosion associated with gullies:** do not occur on this site.
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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.
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7. **Amount of litter movement (describe size and distance expected to travel):** fine litter in the interspaces may move up to 3 feet following a significant run-off event. Coarse litter generally does not move. Some litter will be caught between rocks.
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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** values should range from 4 to 6 but needs to be tested.
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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** structure ranges weak very fine granular to weak fine granular. Soil organic matter (SOM) needs to be determined. The A or A1 horizon is typically 7 inches thick. Soil surface color is 10YR very dark grayish brown moist.
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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Bunchgrasses, especially deep-rooted perennials, slow run-off and increase infiltration. Tall shrubs accumulate snow in the interspaces. Surface stones will also slow water and help 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: tall shrubs
- Sub-dominant: Cool season deep-rooted perennial bunchgrasses
- Other: perennial forbs
- Additional: shallow rooted perennial bunchgrasses
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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** mountain big sagebrush and antelope bitterbrush will become decadent in the absence of fire and ungulate grazing. Grass and forb mortality will occur as tall shrubs increase.
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14. **Average percent litter cover (%) and depth (in):** 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.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** is 775 pounds per acre (860kilograms per hectare) in a year with normal temperatures and precipitation. Perennial grasses produce 20-40percent of the total production, forbs 5-15 percent and shrubs 50-80 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, whitetop, rush skeletonweed, musk and scotch thistle, and diffuse and spotted knapweed.
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17. **Perennial plant reproductive capability:** all functional groups have the potential to reproduce in most years.
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