

Ecological site R010XA031ID Bouldery Loam 12-16 PZ ARTRV/FEID

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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 generally less than 30%, occurring on all aspects
- Soils are greater than 20" deep
- Site not associated with recent lava flows
- Soils are not sandy
- Site has large boulders on or near surface
- Site is above 5000 ft. elevation

Associated sites

R010XA003ID	Loamy 12-16 PZ ARTRT/FEID Adjacent low slope areas without large boulders on or near the surface
R010XA009ID	South Slope Gravelly 12-16 PZ Adjacent south slopes
R010XA037ID	Shrubby Stony North 12-16 PZ ARTRV/FEID Adjacent north slopes

Similar sites

R010XA032ID	Bouldery 11-13 PZ ARTRX/PSSPS Site is below 5000 ft. elevation
R010XA022ID	Sandy Loam 12-16 PZ Soils are sandy

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 undulating to hilly slopes less than 30 percent on all aspects. Elevations range from 5100 to 6000 feet (1550 to 1850 meters).

Table 2. Representative physiographic features

Landforms	(1) Foothills > Hill (2) Foothills > Plain
Flooding frequency	None
Ponding frequency	None
Elevation	1,554–1,829 m
Slope	1–30%
Water table depth	203 cm
Aspect	Aspect is not a significant factor

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)	305-406 mm
Frost-free period (actual range)	
Freeze-free period (actual range)	
Precipitation total (actual range)	305-457 mm

Frost-free period (average)	86 days
Freeze-free period (average)	120 days
Precipitation total (average)	381 mm

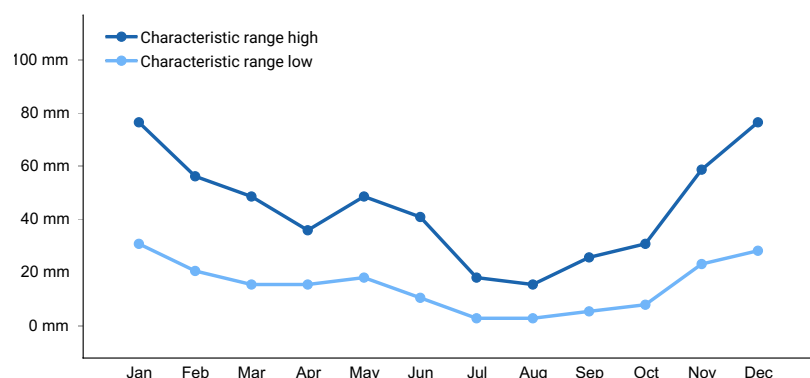


Figure 1. Monthly precipitation range

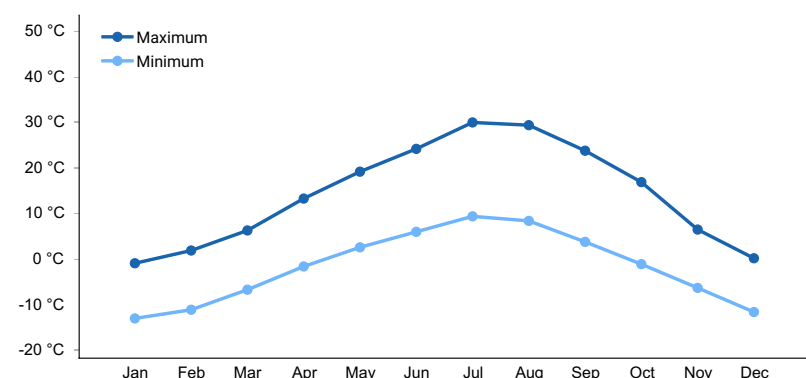


Figure 2. Monthly average minimum and maximum temperature

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 moderately deep soils to bedrock. They are well drained, impermeable or moderately slow permeability, with very low available water capacity. Runoff is medium to high. The erosion hazard is moderate to very severe by water. The surface texture is generally loamy with surface stones and boulders. These soils are characterized by a xeric soil moisture regime. Soil temperature regime is frigid.

Soil Series Correlated to this Ecological Site

Mug, and Muleshoe

Table 4. Representative soil features

Parent material	(1) Colluvium–volcanic rock
Surface texture	(1) Extremely bouldery loam (2) Extremely stony loam
Family particle size	(1) Loamy-skeletal

Drainage class	Well drained
Permeability class	Very slow to moderately slow
Soil depth	51–102 cm
Surface fragment cover <=3"	9–12%
Surface fragment cover >3"	36–41%
Available water capacity (0-101.6cm)	3.05–6.86 cm
Soil reaction (1:1 water) (0-101.6cm)	5.6–7.3
Subsurface fragment volume <=3" (10.2-152.4cm)	10–40%
Subsurface fragment volume >3" (10.2-152.4cm)	30–45%

Ecological dynamics

This site is dominated by mountain big sagebrush with Idaho fescue in the understory. In drier areas Idaho fescue may be co-dominant with bluebunch wheatgrass. Composition by weight is approximately 40 to 55 percent grasses, 10 to 20 percent forbs, and 30 to 40 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, and lagomorphs.

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 suited for grazing by livestock in spring, early summer, and fall. It also provides habitat for mule deer, Rocky Mountain elk, small game, sage grouse, small birds, and rodents in the spring, summer, and fall. The site provides limited recreational opportunities except early spring flower observation.

This site is not easily degraded by improper grazing management due to the stony surface which limits livestock access. Inherent low production on the site makes it susceptible to accelerated degradation. Infiltration and production can be maintained with a mixed stand of deep-rooted perennial bunchgrasses and shrubs. Runoff potential is moderate and the erosion hazard is slight to moderate.

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.

When fires become more frequent than historic levels (20 to 50 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, medusahead, or bulbous 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. As cheatgrass and medusahead increase along with other annuals, fires become more frequent.

Continued improper grazing management influences fire frequency by increasing fine fuels.

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.

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 shrub species on this site can have very negative impacts on wildlife.

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 effected 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.

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:

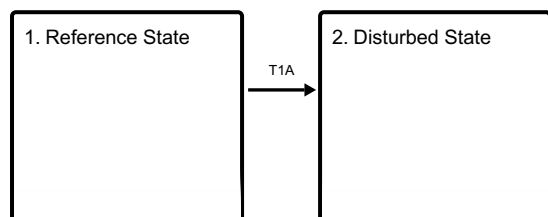
Decreased infiltration and increased runoff occur with the increase in mountain big sagebrush. Desired understory species can be reduced. The increased runoff also causes sheet and rill erosion. This composition change can affect nutrient and water cycles. Abnormally short fire frequency also gives the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

Practice Limitations:

Moderate limitations exist for implementing vegetative management practices due to surface stones. Early spring grazing should be avoided when soils are wet. Moderate limitations exist for implementing facilitating practices on this site. Shallow and stony soils present severe limitations for range seeding by ground moving equipment.

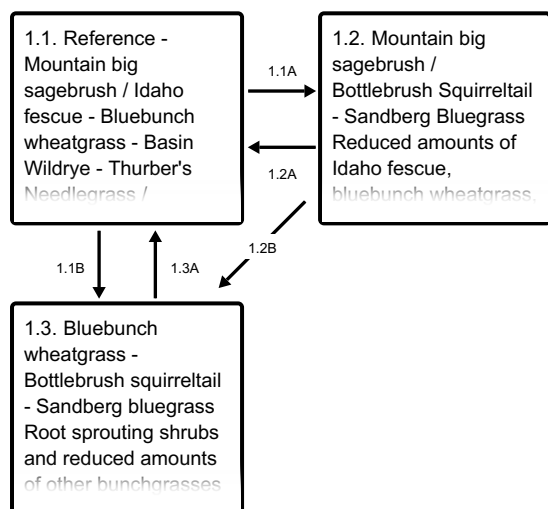
State and transition model

Ecosystem states



T1A - Frequent fire and/or improper grazing management

State 1 submodel, plant communities



1.1A - improper grazing management, absence of fire

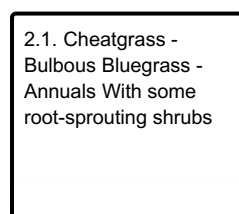
1.1B - fire

1.2A - prescribed grazing and brush management

1.2B - fire

1.3A - prescribed grazing and 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

Reference - Mountain big sagebrush / Idaho fescue - Bluebunch wheatgrass - Basin Wildrye - Thurber's Needlegrass / Antelope Bitterbrush

The Reference Plant Community Phase is 1.1. This plant community is dominated by Idaho fescue, bluebunch wheatgrass, and mountain big sagebrush. Antelope bitterbrush is the subdominant shrub. Other major species include basin wildrye, Thurber's needlegrass, Sandberg bluegrass, bottlebrush squirreltail, lupine, and arrowleaf balsamroot. The plant species composition of Phase 1.1 is listed later under "Reference Plant Community Phase Plant Species Composition". Natural fire frequency is 20 to 50 years. Total annual production is 725 pounds per acre (812 kilograms per hectare) in a normal year. Production in a favorable year is 825 pounds per acre (924 kilograms per hectare). Production in an unfavorable year is 650 pounds per acre (728 kilograms per hectare). Structurally, cool season deep rooted perennial bunchgrasses are very dominant, followed by tall shrubs being more dominant than perennial forbs while shallow rooted perennial bunchgrasses are subdominant.

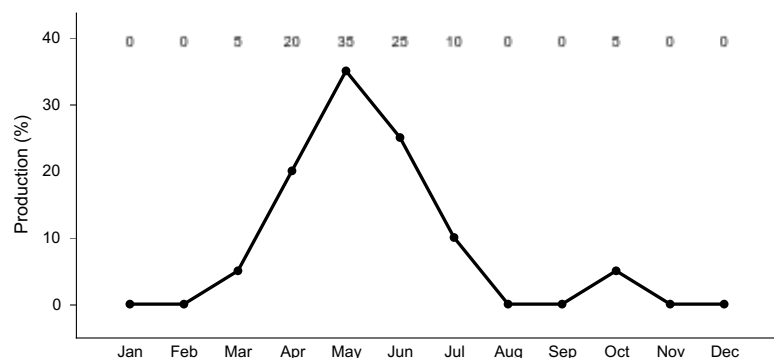


Figure 3. Plant community growth curve (percent production by month). ID0301, ARTRV HCPC. State 1.

Community 1.2

Mountain big sagebrush / Bottlebrush Squirreltail - Sandberg Bluegrass Reduced amounts of Idaho fescue, bluebunch wheatgrass, and other bunchgrasses in low vigor.

Reduced amounts of Idaho fescue, bluebunch wheatgrass, and other bunchgrasses in low vigor. This plant community is dominated by mountain big sagebrush with reduced amounts of bluebunch wheatgrass and Idaho fescue. Bottlebrush squirreltail and Sandberg bluegrass 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 may be present but in reduced vigor and hedged. This state has developed due to improper grazing management and lack of fire. Some cheatgrass, bulbous bluegrass, and/or medusahead may have invaded the site.

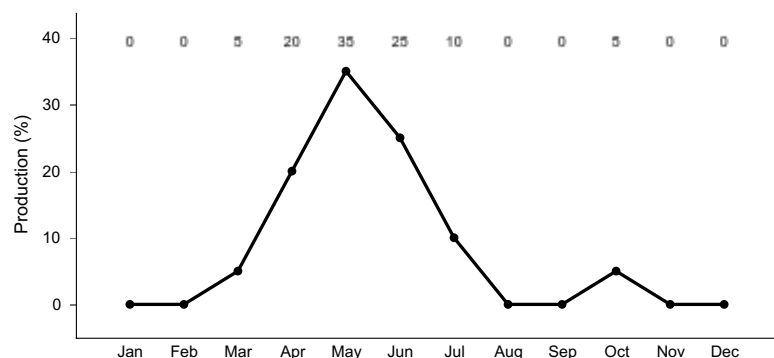


Figure 4. Plant community growth curve (percent production by month).
ID0301, ARTRV HCPC. State 1.

Community 1.3

Bluebunch wheatgrass - Bottlebrush squirreltail - Sandberg bluegrass Root sprouting shrubs and reduced amounts of other bunchgrasses

Root sprouting shrubs and reduced amounts of other bunchgrasses This plant community is dominated by bluebunch wheatgrass with some rabbitbrush and other root-sprouting shrubs. Thurber's needlegrass and Idaho fescue can be lost due to fire. Bottlebrush squirreltail and Sandberg bluegrass have 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.

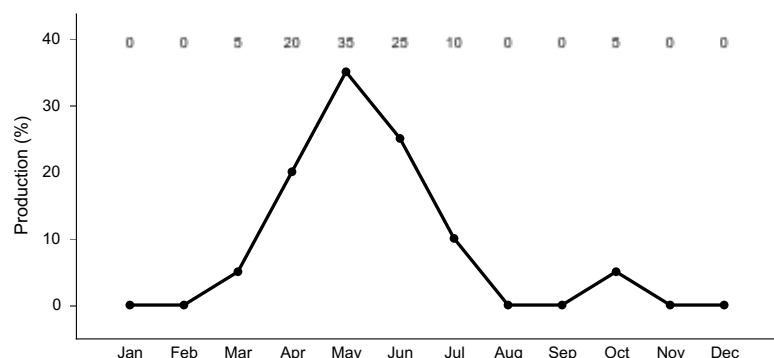


Figure 5. Plant community growth curve (percent production by month).
ID0301, ARTRV HCPC. State 1.

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 1.2. 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

Resilience management. 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.

Dominant plant species

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

Community 2.1

Cheatgrass - Bulbous Bluegrass - Annuals With some root-sprouting shrubs

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

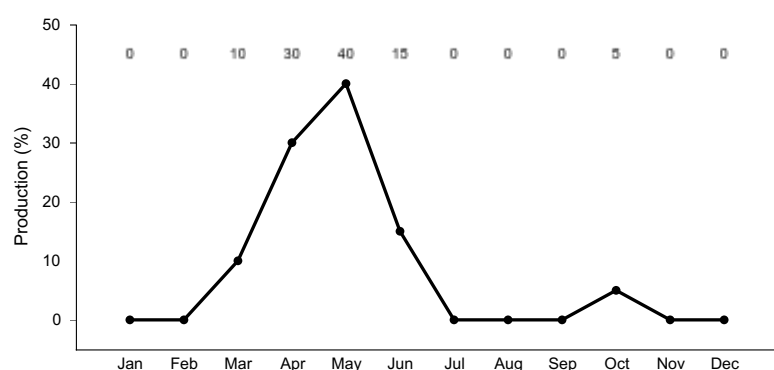


Figure 6. Plant community growth curve (percent production by month).
ID0302, ARTRV Early Seral.

Transition T1A

State 1 to 2

State 1 Phase 1.2 to State 2. Develops with 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. Large herbivore use of this ecological site is dominated by mule deer, pronghorn antelope, and elk. Important seasonal habitat is provided for resident and migratory animals including western toad, sagebrush lizard, western rattlesnake, shrews, bats, jackrabbits, ground squirrels, mice, coyote, red fox, badger, sage-grouse, Ferruginous hawk, prairie falcon, horned lark and western meadowlark. Changes in the plant community composition can reduce the number and diversity of wildlife species in the area. With reduced shrub cover shrub obligate avian and mammal species become rare including sage-grouse, brewer's sparrow and sage thrasher. Encroachment of noxious and invasive plant species (cheatgrass, Medusahead) can replace native plant species which provide critical feed, brood-rearing and nesting cover for a variety of native wildlife. The loss of herbaceous 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 natural 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/ Idaho Fescue/ Bluebunch 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 reference 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 (lek sites, nesting areas, winter cover and food) for sage-grouse is provided by this diverse plant community. The plant community supports the needs of large mammals (mule deer, antelope, and elk) providing food and cover on a seasonal basis. Mountain big sagebrush and antelope bitterbrush are preferred browse for wild ungulates. A diverse small mammal population including golden-mantled ground squirrels, chipmunks and yellow-bellied marmots utilize this plant community. The deer mouse is the primary vector for planting bitterbrush seed.

State 1 Phase 1.2 – Mountain Big Sagebrush/ Bottlebrush Squirreltail/Sandberg Bluegrass Plant Community: This plant community is the result of improper grazing management and/or 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 populations of reptiles may be reduced due to 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 obligates include Brewer's sparrow, sage sparrow, sage thrasher and sage-grouse. Reduced herbaceous understory is a primary factor in limiting the use of this plant community by avian species. Critical habitat (lek sites, nesting areas, winter cover and food) for sage-grouse is limited due to a less diverse herbaceous plant community. The plant community supports the seasonal needs of large mammals (mule deer, antelope, and elk) providing food and cover. Mountain big sagebrush and antelope bitterbrush are preferred browse for wild ungulates. A diverse small mammal population including golden-mantled ground squirrels, chipmunks, deer mouse and yellow-bellied marmots would utilize the habitat. The deer mouse is the primary vector for planting bitterbrush seed.

State 1 Phase 1.3 - Bluebunch Wheatgrass/ Bottlebrush Squirreltail/ Sandberg Bluegrass Plant Community: This plant community is the result of fire. The plant community, dominated by herbaceous vegetation with little or no sagebrush provides less vertical structure and limits use by shrub obligate animals. Insect diversity would be decreased 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 would eliminate use of these areas for nesting by Brewer's sparrow, sage sparrow, sage thrasher, and sage-grouse. This plant community provides limited brood-rearing habitat for sage-grouse if sagebrush cover is adjacent to the site. Sage-grouse would not use the area for winter habitat. The dominant herbaceous vegetation improves habitat for grassland avian species (horned lark and western meadowlark). Large mammal (mule deer, antelope, and elk) use for food would be seasonal but this community would offer little thermal cover and young of year cover. The diversity of small mammals would be dominated by open grassland species like the Columbian ground squirrel.

State 2 – Cheatgrass/ Bulbous Bluegrass and 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 site for bats. The diversity of small mammals would be dominated by open grassland species like the Columbian ground squirrel.

Grazing Interpretations.

This site is best suited for grazing in the late spring, summer, and fall. Access to the site is limited due to surface boulders.

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 provides limited opportunities for recreation due to the surface boulders. Flowering forbs in the spring offer some photography opportunities.

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

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Jim Cornwell, Range Management Specialist, IASCD

Brendan Brazee, State Rangeland Management Specialist, NRCS, Idaho

Leah Juarros, Resource Soil Scientist, NRCS, Idaho

Lee Brooks, Range Management Specialist, IASCD

Type locality

Location 1: Lincoln County, ID

References

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

Other references

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USDI Bureau of Land Management, US Geological Survey; USDA Natural Resources Conservation Service, Agricultural Research Service; Interpreting Indicators of Rangeland Health. Technical Reference 1734-6; Version 4-2005.

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	03/26/2008
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

- Number and extent of rills:** rills are rare on this site. If they are present they are likely to occur on slopes greater than 15 percent and immediately following a wildfire or high intensity storm. Rills are most likely to occur on soils with silt loam or clay loam surface textures. Surface stones reduce rill development.
- Presence of water flow patterns:** water-flow patterns are rare on this site. They are most likely to occur on slopes greater than 15 percent. When they do occur they are short and disrupted by cool season grasses, shrubs, and surface stones. They are not extensive.

3. **Number and height of erosional pedestals or terracettes:** pedestals can occur on the site where flow patterns are present and the surface soils have a high clay content. Do not mistake frost-heaving for pedestals. Terracettes occur occasionally.
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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** needs data but is expected to range from 25-35 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:** usually 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 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 from weak very fine granular to moderate medium granular. Soil organic matter (SOM) needs to be determined. The A or A1 horizon is typically 4 inches thick. Soil surface color is very dark grayish brown or very dark 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 runoff and increase infiltration. Surface stones aid in slowing water movement and increasing infiltration. Tall shrubs accumulate some snow in the interspaces.
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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** not present.
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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**
- Dominant: cool season deep-rooted perennial bunchgrasses
- Sub-dominant: tall shrubs
- Other: perennial forbs
- Additional: shallow rooted 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 data is needed but is expected to be low and at a shallow depth.
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** is 725 pounds per acre (812 Kg/ha) in a year with normal precipitation and temperatures. Perennial grasses produce 40-55 percent of the total production, forbs 10-20 percent and shrubs 30-40 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, medusahead, Vulpia species, bulbous bluegrass, annual mustards, and rush skeletonweed.
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17. **Perennial plant reproductive capability:** all functional groups have the potential to reproduce in most years.
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