

Ecological site R010XA032ID Bouldery 11-13 PZ ARTRX/PSSPS

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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 below 5000 ft. elevation

Associated sites

R010XA033ID	Loamy 11-13 PZ ARTRX/PSSPS Adjacent low slope areas without large boulders on or near the surface
R010XA034ID	Claypan 10-12 PZ ARTR4/PSSPS-ACTH7 Adjacent low slope areas with 20-40" soils to a duripan

Similar sites

R010XA033ID	Loamy 11-13 PZ ARTRX/PSSPS No large boulders on or near the surface
R010XA031ID	Bouldery Loam 12-16 PZ ARTRV/FEID Site is above 5000 ft. elevation

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Artemisia tridentata ssp. xericensis</i>
Herbaceous	(1) <i>Pseudoroegneria spicata ssp. spicata</i>

Physiographic features

This site occurs on all aspects of undulating to hilly slopes. Slopes are generally less than 30 percent. Elevations generally range from 4250 to 5000 feet (1300 to 1525 meters).

Table 2. Representative physiographic features

Landforms	(1) Foothills > Hill (2) Foothills > Butte
Flooding frequency	None
Ponding frequency	None
Elevation	1,295–1,524 m
Slope	1–30%
Water table depth	152 cm
Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Flooding frequency	Not specified
Ponding frequency	Not specified
Elevation	Not specified
Slope	1–35%
Water table depth	Not specified

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. This ecological site is found in the drier zone of this MLRA. Monthly precipitation is generally greatest in December, diminishes steadily reaching 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 4. Representative climatic features

Frost-free period (characteristic range)	75-98 days
Freeze-free period (characteristic range)	106-133 days
Precipitation total (characteristic range)	279-330 mm
Frost-free period (actual range)	
Freeze-free period (actual range)	
Precipitation total (actual range)	279-457 mm
Frost-free period (average)	86 days
Freeze-free period (average)	120 days
Precipitation total (average)	305 mm

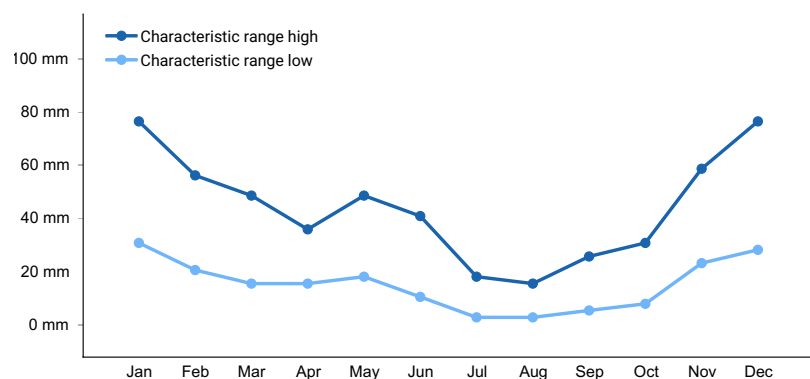


Figure 1. Monthly precipitation range

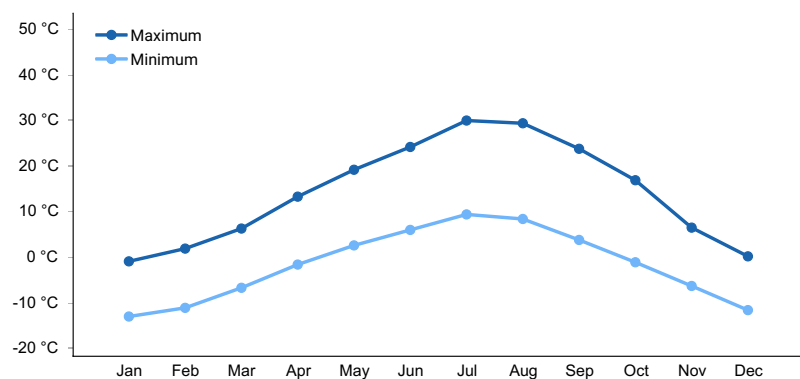


Figure 2. Monthly average minimum and maximum temperature

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

Soil Series Correlated to this Ecological Site

Nammoth

Table 5. Representative soil features

Parent material	(1) Loess (2) Colluvium–volcanic rock
Surface texture	(1) Extremely stony silt loam (2) Extremely bouldery loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Slow
Soil depth	51–102 cm
Surface fragment cover ≤3"	13%
Surface fragment cover >3"	39%
Available water capacity (0-101.6cm)	3.3–5.33 cm
Soil reaction (1:1 water) (0-101.6cm)	5.6–7.3
Subsurface fragment volume ≤3" (10.2-152.4cm)	15–20%
Subsurface fragment volume >3" (10.2-152.4cm)	36–53%

Ecological dynamics

The dominant visual aspect of this site is foothills big sagebrush and bluebunch wheatgrass with an interspersed of antelope bitterbrush plants. Composition by weight is approximately 55 to 65 percent grasses, 10-20 percent forbs and 20 to 30 percent shrubs.

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

Fire has historically occurred on the site at intervals of 50 to 70 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 domestic livestock grazing in spring, summer, and fall. The site has high value as wildlife habitat due to its vegetation diversity. Because of the bouldery surface, the site is fairly resistant to disturbances that can potentially degrade it.

Impacts on the Plant Community.

Influence of fire:

In the absence of normal fire frequency, bitterbrush increases to the point of being co-dominant with foothills big sagebrush. Grasses and forbs decrease as shrubs increase

When fires become more frequent than historic levels (50 to 70 years), foothills big sagebrush and bitterbrush are

reduced significantly. With continued short fire frequency, foothills big sagebrush and bitterbrush can be completely eliminated along with many of the desirable understory species such as bluebunch wheatgrass and Thurber's needlegrass. These species may be replaced by cheatgrass, Sandberg bluegrass, and bulbous bluegrass along with a variety of annual and perennial forbs including noxious and invasive plants. Medusahead will invade on the soils with the heavier textures.

Influence of improper grazing management.

Season-long grazing and/or excessive utilization can be very detrimental to this site. This type of management leads to reduced vigor of the bunchgrasses and possibly bitterbrush. With reduced vigor, recruitment of these species declines. As these species decline, the plant community becomes susceptible to invasion by noxious and invasive plants.

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

Weather influences:

Above normal precipitation in March, April, and May can dramatically increase total annual production of the plant community. These weather patterns can also increase viable seed production of desirable species to provide for recruitment. Likewise, below normal precipitation during the 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. Prolonged drought can lead to a reduction in fire frequency.

Influence of insects and disease:

Insect and disease outbreaks can affect vegetation health. The tent caterpillar (*Malacosoma fragilis*) defoliate bitterbrush. Two consecutive years of defoliation can cause mortality in bitterbrush. Outbreaks of Mormon crickets and grasshoppers occur occasionally. They seldom cause lasting damage since defoliation usually occurs once per year.

An outbreak of a particular insect is usually influenced by weather but no specific data for this site is available.

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 weeds 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 and in moderate winters. 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.

High numbers of burrowing rodents provide bare ground areas that allow invasion of invasive species. The deer mouse is beneficial to this site as it is the principal vector for planting bitterbrush seed.

Watershed.

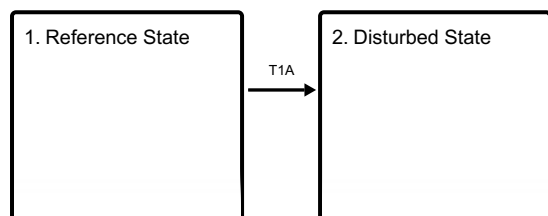
Decreased infiltration and increased runoff occur with an increase in foothills big sagebrush. Desired understory species can be reduced. This composition change can affect nutrient and water cycles. Increased runoff also causes sheet and rill erosion. Abnormally short fire frequency also gives the same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

Practice Limitations.

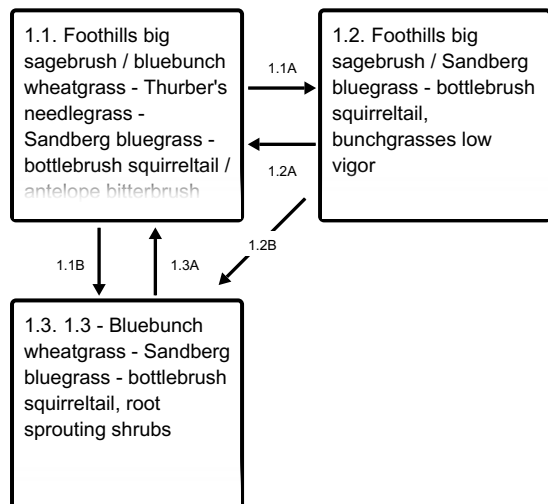
Severe limitations exist on this site for seeding and brush management by conventional ground machinery due to excessive stones and boulders on or near the soil surface.

State and transition model

Ecosystem states



State 1 submodel, plant communities



1.1A - improper grazing management and no fire

1.1B - fire

1.2A - prescribed grazing

1.2B - fire

1.3A - prescribed grazing and no fire

2.1. Sandberg
bluegrass - cheatgrass
- annuals

State 1
Reference State

Dominant plant species

- big sagebrush (*Artemisia tridentata ssp. xericensis*), shrub
- bluebunch wheatgrass (*Pseudoroegneria spicata ssp. spicata*), grass

Community 1.1
Foothills big sagebrush / bluebunch wheatgrass - Thurber's needlegrass - Sandberg bluegrass - bottlebrush squirreltail / antelope bitterbrush

The Reference Plant Community Phase is Phase 1.1. This plant community is dominated by foothills big sagebrush and bluebunch wheatgrass. Subdominants include antelope bitterbrush, Thurber’s needlegrass, basin wildrye, bottlebrush squirreltail, and arrowleaf balsamroot. Natural fire frequency is 50 to 70 years. The plant species composition of Phase 1.1 is listed later under “Reference Plant Community Phase Plant Species Composition”.

Resilience management. Total annual production is 700 pounds per acre (777 kilograms per hectare) in a normal year. Production in a favorable year is 1100 pounds per acre (1222 kilograms per hectare). Production in an unfavorable year is 500 pounds per acre (555 kilograms per hectare). Structurally, cool season deep rooted perennial bunchgrasses are dominant, followed by tall shrubs being more dominant than perennial forbs while shallow rooted perennial bunchgrasses are subdominant.

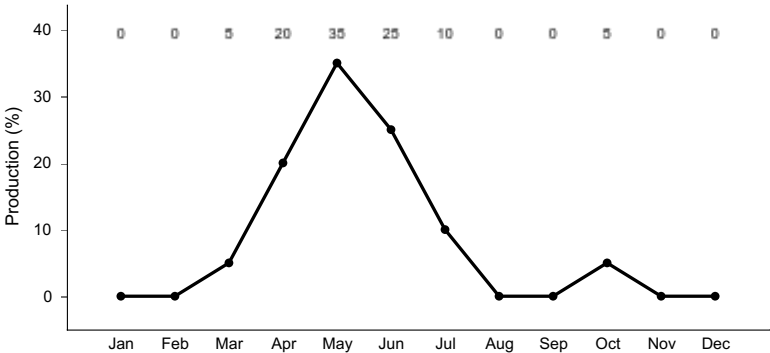


Figure 3. Plant community growth curve (percent production by month). ID0301, ARTRV HCPC. State 1.

Community 1.2
Foothills big sagebrush / Sandberg bluegrass - bottlebrush squirreltail, bunchgrasses low vigor

Reduced amounts of bluebunch wheatgrass and other bunchgrasses in low vigor. This plant community is dominated by foothills big sagebrush with reduced amounts of bluebunch wheatgrass. Sandberg bluegrass and bottlebrush squirreltail has increased in the understory. There is a reduced amount of Thurber’s needlegrass. All deep-rooted bunchgrasses are typically in low vigor. Antelope bitterbrush is usually hedged. Foothills big sagebrush has increased. This state has developed due to improper grazing management and no fire. Some cheatgrass may have invaded the site.

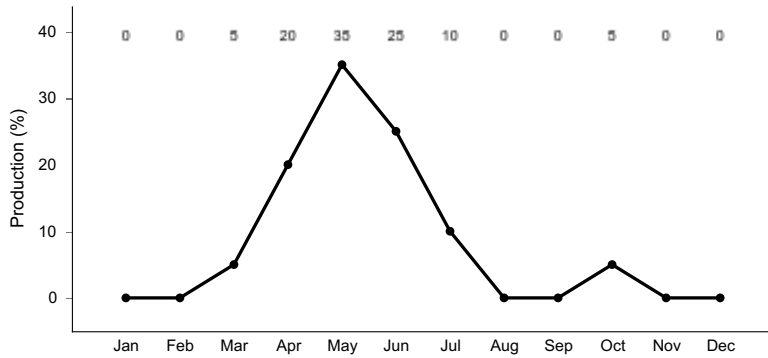


Figure 4. Plant community growth curve (percent production by month).
ID0301, ARTRV HCPC. State 1.

Community 1.3

1.3 - Bluebunch wheatgrass - Sandberg bluegrass - bottlebrush squirreltail, root sprouting shrubs

Reduced amounts of Thurber's needlegrass, Foothills big sagebrush, and antelope bitterbrush. Root sprouting shrubs present. This plant community is dominated by bluebunch wheatgrass and Sandberg bluegrass. Thurber's needlegrass can be lost due to fire. Some basin wildrye may be present. Bottlebrush squirreltail has increased. Forbs remain about in the same proportion as Phase A. Little foothills big sagebrush and antelope bitterbrush is present due to wildfire, but some rabbitbrush and horsebrush are present due to sprouting. Some cheatgrass may have invaded the site. This plant community is the result of wildfire.

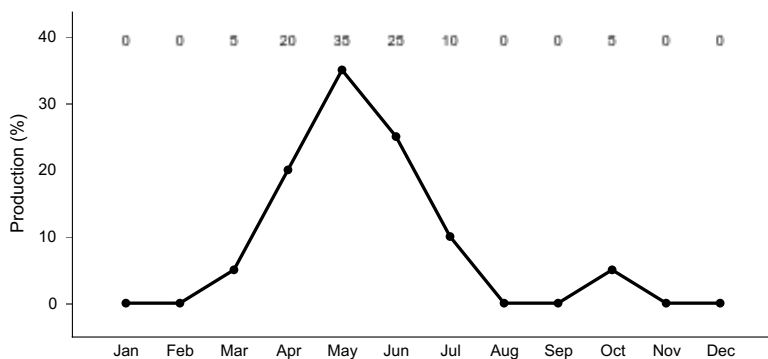


Figure 5. Plant community growth curve (percent production by month).
ID0301, ARTRV HCPC. State 1.

Pathway 1.1A

Community 1.1 to 1.2

Phase 1.1 to 1.2. Develops with improper grazing management and no 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.

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 move this state back to State 1 with accelerating practices.

Dominant plant species

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

Community 2.1

Sandberg bluegrass - cheatgrass - annuals

Root sprouting shrubs can be present. This plant community is dominated by Sandberg bluegrass, cheatgrass, and other annuals. Root sprouting shrubs such as rabbitbrush and horsebrush 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. This state has crossed the threshold. It is economically impractical to move this state back to State 1 with accelerating practices.

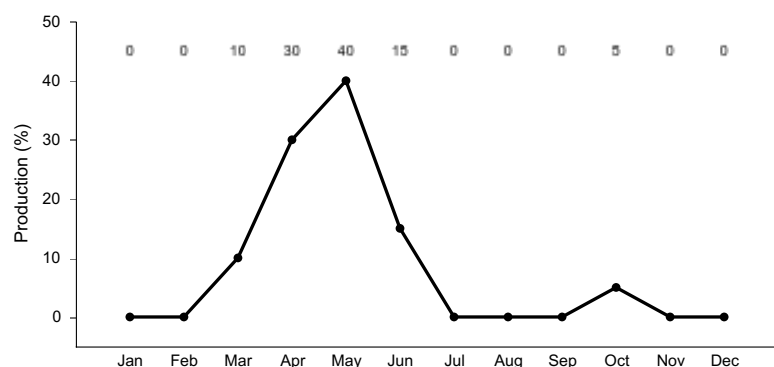


Figure 6. Plant community growth curve (percent production by month). ID0302, ARTRV Early Serai.

Transition T1A

State 1 to 2

State 1 Phase C to State 2. Develops through frequent fire and/or continued improper grazing management. This state has crossed the threshold. It is economically impractical to move this state back to State 1 with accelerating practices.

Constraints to recovery. frequent fire and/or continued improper grazing management

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 can have a negative impact on ground nesting birds, while the loss of shrub cover negatively affects both ground and shrub nesting avians. Water is limited only being provided by seasonal runoff, artificial water catchments and 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 - Foothills Big Sagebrush/ Bluebunch Wheatgrass/ Thurber's Needlegrass/Sandberg Bluegrass/ 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. 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 (lek sites, nesting areas, winter cover and food) for sage-grouse is provided by this diverse plant community. The plant community supports seasonal needs of large mammals (mule deer and elk) providing food and cover. Antelope bitterbrush is preferred browse for wild ungulates. A diverse small mammal population including golden-mantled ground squirrels, chipmunks, yellow-bellied marmots and pygmy rabbits utilize this plant community. The deer mouse is the primary vector for planting bitterbrush seed.

State 1 Phase 1.2 – Foothills 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 reduced 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 the reptile community would decline due to a reduced understory and associated loss of invertebrate habitat. Spring developments that capture all available hydrology 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 key 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 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. A diverse small mammal population including golden-mantled ground squirrels, chipmunks, deer mouse and yellow-bellied marmots would utilize the available habitat. The deer mouse is the primary vector for planting bitterbrush seed.

State 1 Phase 1.3 - Bluebunch Wheatgrass/ Sandberg Bluegrass/ 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, sage thrasher, and sage-grouse. This plant community provides limited brood-rearing habitat for sage-grouse when sagebrush cover is adjacent to the site. Winter habitat for sage-grouse is eliminated. The dominant 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 diversity of small mammals would be dominated by open grassland species like the Columbian ground squirrel.

State 2 – Sandberg Bluegrass/ Cheatgrass/ 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 diversity of small mammals would be dominated by open grassland species like the Columbian ground squirrel.

Grazing Interpretations.

This site is suited for grazing by domestic livestock in the spring, 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

No data

Recreational uses

This site has medium values for recreation and natural beauty. Spring and early summer blooming forbs among the boulders on the surface offer a pleasing view. It has low value for camping, picnicking, ATV riding, and horseback riding due to numerous boulders on the surface. Some hunting of mule deer and upland game birds occurs.

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

Leah Juarros, Resource Soil Scientist, NRCS, Idaho

Type locality

Location 1: Lincoln County, ID

References

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

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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.

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, 5/14/2024

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

1. **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 and on slopes greater than 15 percent.

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

3. **Number and height of erosional pedestals or terracettes:** both occur on this site but are not extensive. In areas where flow patterns and/or rills are present, a few pedestals may be expected. Terracettes occur on the site uphill from bases of tall shrubs, large bunchgrasses, and surface stones and boulders.

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 25-35 percent.

5. **Number of gullies and erosion associated with gullies:** 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 3 feet following a significant run-off event. Coarse litter generally does not move. Stones and boulders on the surface help reduce fine litter movement.

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

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** structure ranges from weak subangular blocky to moderate medium granular. Soil organic matter (SOM) needs to be determined. The A or A1 horizon is typically 5 inches thick. Surface color moist is very dark grayish brown.

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 catch blowing 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.

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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 bunchgrasses

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** foothills big sagebrush and antelope bitterbrush will become decadent in the absence of normal fire frequency 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 15-20 percent to a depth of 0.1 inches. Under mature shrubs litter is >0.5 inches deep and is 90-100 percent ground cover.
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** is 700 pounds per acre (777 kilograms per hectare) in a year with normal temperatures and precipitation. Perennial grasses produce 55-65 percent of the total production, forbs 10-20 percent, and shrubs 20-30 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, bulbous bluegrass, 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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