

Ecological site R010XA048ID Cindery South 12-16 PZ PUTR2-ARTRV/PSSPS

Last updated: 12/13/2023
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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

Classification relationships

No data.

Ecological site concept

- Site occurs on uplands
- Slopes greater than 30% on southerly aspects
- Occurs in 12-16 inch PZ
- Soils are volcanic cinders

Associated sites

R010XA047ID	Cindery North 12-16 PZ ARTRV-PUTR2/FEID-PSSPS Adjacent north aspects
R010XA020ID	Mixed Shrub 12-16 PZ Adjacent low slope areas with shallow soils
R010XA043ID	Cinder North 12-16 PZ PIFL2/PUTR2 Adjacent north aspects

R010XA044ID	Cinder 12-16 PZ PIFL2/ARTRV Adjacent low slope areas
R010XA045ID	Cinder South 12-16 PZ PUTR2/HECO26 Adjacent south aspects
R010XA046ID	Cinder Garden 12-16 PZ EROVD-LERE7 Adjacent low slope cinder gardens

Similar sites

R010XA045ID	Cinder South 12-16 PZ PUTR2/HECO26 Site supports PUTR2/HECO26 rather than PUTR2-ARTRV/PSSPS, no abiotic criteria identified
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Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Purshia tridentata</i> (2) <i>Artemisia tridentata ssp. vaseyana</i>
Herbaceous	Not specified

Physiographic features

This site occurs on moderate mountain side slopes on south, south-west, or west aspects. Slopes range from 30 to 60 percent. The elevation ranges from about 5000 to 7000 feet (1500 to 2150 meters).

Table 2. Representative physiographic features

Landforms	(1) Mountains > Mountain slope
Flooding frequency	None
Ponding frequency	None
Elevation	1,524–2,134 m
Slope	30–60%
Aspect	W, S, SW

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 (average)	98 days
Freeze-free period (average)	133 days
Precipitation total (average)	406 mm

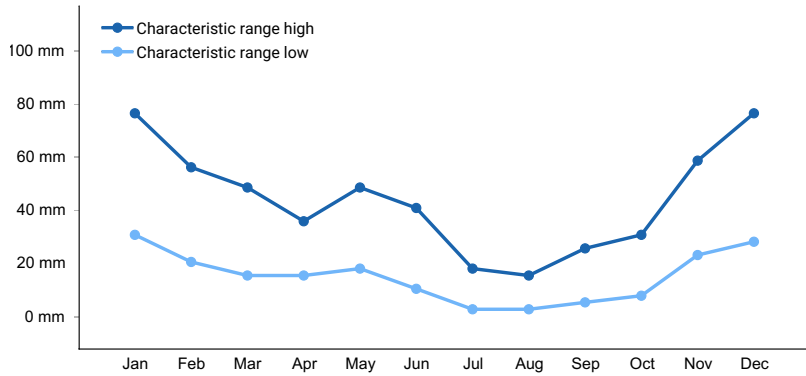


Figure 1. Monthly precipitation range

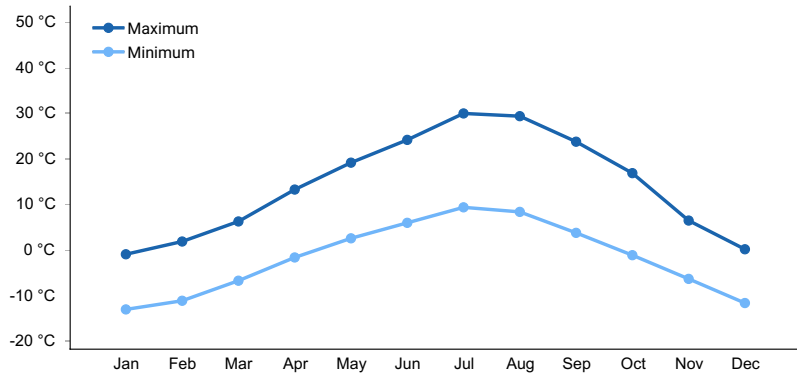


Figure 2. Monthly average minimum and maximum temperature

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 are formed in volcanic cinders. They are gravelly or very gravelly loams and gravelly coarse sandy loams. The soils have over 35 percent coarse fragments throughout the profile. The subsoils are generally very gravelly sandy loams. The gravels throughout the profile are cinders. The water intake is rapid with well to excessive drainage. Available water capacity is low to medium. Erosion hazard is low

Soil Series Correlated to this Ecological Site.

No data

Table 4. Representative soil features

Parent material	(1) Cinders–volcanic rock
Surface texture	(1) Gravelly loam (2) Very gravelly sandy loam
Drainage class	Well drained to excessively drained

Permeability class	Rapid
Surface fragment cover <=3"	10–35%
Surface fragment cover >3"	0–10%
Available water capacity (0-101.6cm)	0–10.16 cm
Subsurface fragment volume <=3" (Depth not specified)	35–60%
Subsurface fragment volume >3" (Depth not specified)	0–10%

Ecological dynamics

The dominant visual aspect of this site is an overstory of antelope bitterbrush and mountain big sagebrush with bluebunch wheatgrass in the understory. Composition by weight is 50 to 60 percent grasses, 10 to 20 percent forbs, and 25 to 35 percent shrubs.

This site is evolving in a semi-arid climate characterized by dry summers and cold winters. Herbivory has historically occurred on this site at low levels of utilization. Herbivores include mule deer and lagomorphs.

Ecological sites in this portion of the MLRA occur on very young geologic soils with poorly developed profiles. The plant communities reflect this lack of soil development. Six ecological sites have been identified based on relative soil development and are found in association on the landscape. Age of the soils and the associated sites can be shown in the following diagram:

Non-aspect sites

Volcanic ? Cinder ? Cinder? Cindery
Activity Garden (not described)

Aspect sites

Volcanic ? Cinder ? Cinder? Cindery
Activity Garden North or North or
South South

-----Soil development -----?

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

The Reference State (state 1), moves through many phases depending on the natural and man-made forces that impact the community over time. State 1, described later, indicates some of these phases.

FUNCTION:

This site is suited for big game animals as late spring, summer, and fall range. The site can be winter range for big game in moderate winters. It is not well suited to livestock grazing due to unstable soils that can be severely disturbed and moved down slope from hoof action. It is also suited for wildflower observation in the spring and early summer.

Infiltration is good where the community is in mid to late seral status. Snow accumulates on the site due to the high elevation and presence of tall shrubs.

Impacts on the Plant Community.

Influence of fire:

In the absence of normal fire frequency, mountain big sagebrush and antelope bitterbrush can gradually increase on the site. Grasses and forbs decrease as shrubs increase. With the continued absence of fire, mountain big sagebrush and bitterbrush can displace most of the primary understory species. Decadence is apparent in Mountain big sagebrush and antelope bitterbrush near the end of the normal fire cycle.

When fires become more frequent than historic levels (20-50 years), mountain big sagebrush and antelope bitterbrush are reduced significantly. Rabbitbrush can increase slightly. With continued short fire frequency, mountain big sagebrush and antelope bitterbrush can be completely eliminated along with many of the desirable understory species such as bluebunch wheatgrass. These species may be replaced by Canby bluegrass along with a variety of annual and perennial forbs including noxious and invasive plants. Cheatgrass will invade the site at lower elevations. These fine fuels will increase the fire frequency.

Influence of improper grazing management:

This site is not well suited to livestock grazing due to unstable soils that can be severely disturbed and moved down slope from hoof action. Season-long grazing and excessive utilization can be very detrimental to this site. This type of management leads to reduced vigor of the bunchgrasses. Bitterbrush will be hedged. With reduced vigor, recruitment of these species declines. As these species decline, an increase in mountain big sagebrush and noxious and invasive plants will occur.

Continued improper grazing management influences fire frequency by increasing fine fuels. As cheatgrass increases and becomes co-dominant with Canby bluegrass and other annuals, fires become more frequent, particularly at lower elevations.

Proper grazing management that addresses frequency, duration, and intensity of grazing can also keep fine fuels from developing, thereby reducing fire frequency. Grazing can lead to down slope movement of soil. This soil movement can kill some plants through either dislodgement or by being buried.

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. Mormon cricket and grasshopper outbreaks occur periodically. Outbreaks seldom cause plant mortality since defoliation of the plant occurs only once during the year of the outbreak. Snow mold can adversely affect the health of mountain big sagebrush.

Influence of noxious and invasive plants:

Many of these species add to the fine-fuel component and lead to increased fire frequency. 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 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. The deer mouse is beneficial to this site as it is the principal vector for planting bitterbrush seed.

Watershed:

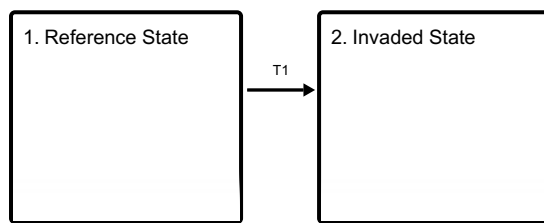
Decreased infiltration and increased runoff occur with an increase in mountain big sagebrush. Desired understory species can be reduced. This composition change can affect nutrient and water cycles. Abnormally short fire frequency also gives the same results, but to a lesser degree. The long-term effect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

Practice Limitations:

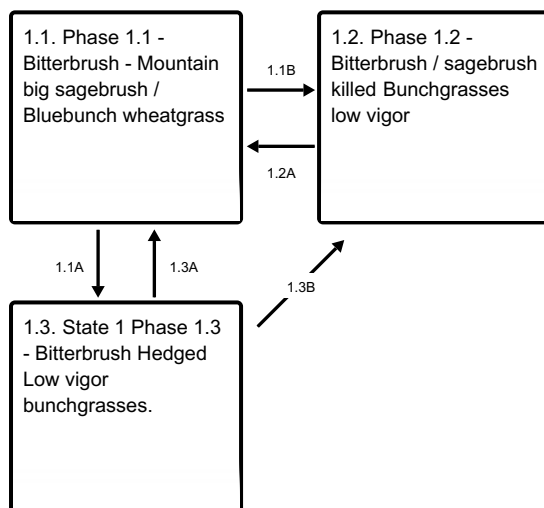
Mechanical seeding is generally not feasible on this site due to steep slopes and gravelly surface. Mechanical brush control is not feasible on steep slopes. Brush management can occur with aerial chemical application or prescribed burning, but needs to be carefully planned and applied to protect the bitterbrush and to ensure that cheatgrass does not increase.

State and transition model

Ecosystem states



State 1 submodel, plant communities



1.1B - fire

1.1A - improper grazing management, surface-disturbing activities, and no fire

1.2A - no fire and controlled surface-disturbing activities

1.3A - controlled surface-disturbing activities

State 2 submodel, plant communities

2.1. Community 2.1 -
Canby bluegrass -
Cheatgrass - Annuals

State 1 Reference State

Community 1.1

Phase 1.1 - Bitterbrush - Mountain big sagebrush / Bluebunch wheatgrass

State 1 Phase 1.1 - Bitterbrush - Mountain big sagebrush / Bluebunch wheatgrass The Reference Plant Community Phase is Phase 1.1. This plant community is dominated by antelope bitterbrush, mountain big sagebrush, bluebunch wheatgrass and Canby bluegrass. Other understory plants include basin wildrye, white stoneseed, and Wyeth buckwheat. The plant species composition of Phase 1.1 is listed later under "Reference Plant Community Phase Plant Species Composition". Natural fire frequency is 20-50 years.

Resilience management. Total annual production is 1100 pounds per acre (1222 kilograms per hectare) in a normal year. Production in a favorable year is 1300 pounds per acre (1444 kilograms per hectare). Production in an unfavorable year is 900 pounds per acre (1000 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 bunchgrasses are subdominant.

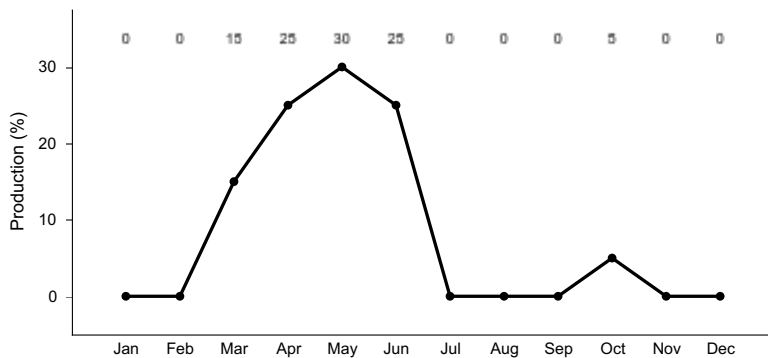


Figure 3. Plant community growth curve (percent production by month). ID0305, ARTRV SOUTH .

Community 1.2

Phase 1.2 - Bitterbrush / sagebrush killed Bunchgrasses low vigor

State 1 Phase 1.2 - Bitterbrush / sagebrush killed, Bunchgrasses low vigor This plant community is dominated by bluebunch wheatgrass. Basin wild rye is about the same as plant community 1.1. Canby bluegrass and bottlebrush squirreltail have increased. Forbs remain about in the same proportion as plant community 1.1. Only small amounts of mountain big sagebrush and antelope bitterbrush occur in the plant community due to fire, but some root-sprouting rabbitbrushes are present. Some cheatgrass may have invaded the site at lower elevations. This plant community is the result of fire (1.1B).

Community 1.3

State 1 Phase 1.3 - Bitterbrush Hedged Low vigor bunchgrasses.

State 1 Phase 1.3 - Bitterbrush Hedged; Low vigor bunchgrasses. This plant community is dominated by mountain big sagebrush and antelope bitterbrush. Grasses and forbs are reduced in the community. All deep-rooted bunchgrasses are typically in low vigor. Tall shrubs have increased. This phase has developed due to improper grazing management, uncontrolled hoof/foot traffic or other soil disturbing activities and no fire (1.1A). If improper grazing management is occurring, most grasses will be in low vigor and bitterbrush will be hedged. If the fire cycle is

longer than normal, tall shrubs become decadent. Some cheatgrass may have invaded the site at lower elevations.

Pathway 1.1B **Community 1.1 to 1.2**

Plant Community Phase 1.1 to 1.2 (1.1B). Develops with fire.

Pathway 1.1A **Community 1.1 to 1.3**

Plant Community Phase 1.1 to 1.3 (1.1A). Develops with improper grazing management, hoof/foot traffic or other surface-disturbing activities and no fire longer than normal fire cycle.

Pathway 1.2A **Community 1.2 to 1.1**

Plant Community Phase 1.2 to 1.1 (1.2A). Develops with no fire and control of surface-disturbing activities.

Pathway 1.3A **Community 1.3 to 1.1**

Plant Community Phase 1.3 to 1.1 (1.3A). Develops with control of all surface-disturbing activities.

Pathway 1.3B **Community 1.3 to 1.2**

Plant Community Phase 1.3 to 1.2 (1.3B). Develops with fire

State 2 **Invaded State**

Community 2.1 **Community 2.1 - Canby bluegrass - Cheatgrass - Annuals**

Plant Community 2.1 - Canby bluegrass - Cheatgrass - Annuals This plant community is dominated by Canby bluegrass, cheatgrass, and other annuals. Root sprouting shrubs such as rabbitbrush can be present, dependent upon, how frequent, fire has occurred. Severe soil movement from hoof/foot traffic has occurred. This state has developed due to frequent fires, improper grazing management, severe hoof/foot traffic, or uncontrolled soil surface disturbing activities (T1A or T1B). It is economically impractical to return this plant community to State 1 with accelerating practices.

Resilience management. Excessive soil movement and changes in the plant community caused by frequent fire or continued uncontrolled surface-disturbing activities cause this state to cross a vegetative 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. Significant soil loss has occurred. Infiltration has been reduced and run-off has become more rapid. This state has developed due to frequent fires, improper grazing management, severe hoof/foot traffic, or uncontrolled soil surface disturbing activities. It is economically impractical to return this plant community to State 1 with accelerating practices.

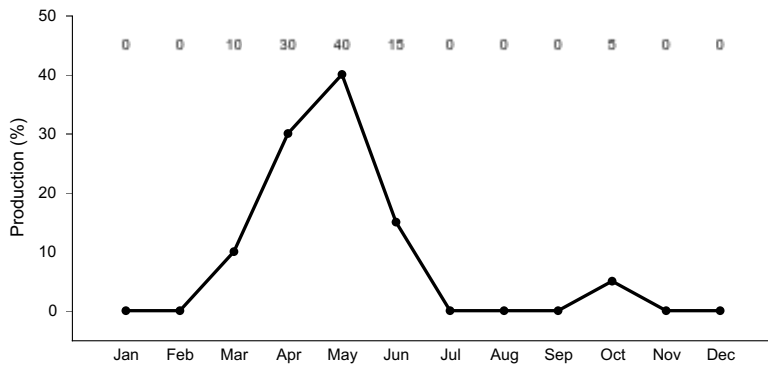


Figure 4. Plant community growth curve (percent production by month). ID0302, ARTRV Early Seral.

Transition T1 State 1 to 2

State 1, Phase 1.2 and 1.3 to State 2 (T1A and T1B). Develops through frequent fires, improper grazing management, severe hoof/foot traffic, or continued uncontrolled surface-disturbing activities. State 2 to State 3, unknown new site (T2.1A). Excessive soil movement and changes in the plant community caused by frequent fire or continued uncontrolled surface-disturbing activities. This site has crossed a vegetative 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.

Additional community tables

Animal community

Wildlife Interpretations.

Animal Community – Wildlife Interpretations

This plant community provides a mixture of forbs and shrubs throughout the growing season, offering suitable habitat for native invertebrates. Mule deer and elk are the large herbivores using the site. The site provides seasonal habitat for resident and migratory animals including sagebrush lizard, shrews, bats, ground squirrels, mice, coyote, red fox, badger, Ferruginous hawk, prairie falcon, Brewers sparrow, sage-grouse, horned lark and western meadowlark. Encroachment of noxious and invasive plant species (cheatgrass and medusahead) in isolated areas can replace native plant species which provide feed, brood-rearing and nesting cover for a variety of native wildlife. Water features are sparse provided by seasonal streams, artificial water catchments and springs.

State 1 Phase 1.1 –Antelope Bitterbrush/ Mountain Big Sagebrush/ 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. An extensive array of forbs and shrubs are in bloom throughout the growing season leading to a diverse native pollinator community. Many avian and mammal species utilize this habitat based on the availability of invertebrate prey species. The reptile community is represented by leopard lizard, short horned lizard, sagebrush lizard, western skink and western rattlesnake. Native shrub-steppe obligate avian species including Brewer’s sparrow, sage sparrow, sage-grouse and sage thrasher use the site. This site can provide nesting and brood rearing habitat for sage-grouse. The plant community provides year round forage and thermal cover for mule deer and elk. Antelope bitterbrush provides preferred winter forage for mule deer and fair forage for elk. The coarse subsoil material would limit burrowing mammals but a small population including golden-mantled ground squirrels, chipmunks and yellow-bellied marmots could be expected on the site. Pikas may utilize the site if adjacent to rocky open areas. The deer mouse is beneficial to this site as it is the principal vector for planting bitterbrush seed.

State 1 Phase 1.2 –Bluebunch Wheatgrass Plant Community Plant Community: This plant community is the result of fire. The plant community, dominated by herbaceous vegetation with little to no sagebrush or antelope bitterbrush would provide less vertical structure for animals than in Phase 1.1. Insect diversity would be reduced with the loss of sagebrush and antelope bitterbrush but a diverse native forb plant community would still support select pollinators. An increase in rabbitbrush would provide late season pollinator habitat. The reptiles, including short horned lizard and sagebrush lizard would be limited or excluded due to the loss of sagebrush. The dominance of herbaceous

vegetation with little sagebrush canopy cover would prevent the use of these areas as nesting habitat by Brewer's sparrow, sage sparrow, sage-grouse, and sage thrasher. This plant community provides limited brood-rearing habitat for sage-grouse if adjacent sagebrush cover is provided. The dominant herbaceous vegetation improves habitat for grassland avian species (horned lark and western meadowlark). Mule deer and elk would use site for seasonal (spring, summer and fall) forage needs but the site would offer little thermal cover and young of year cover. The loss of shrub cover would allow higher predation of small mammals and would favor grass seed eating mammal species.

State 1 Phase 1.3- Mountain Big Sagebrush/ Antelope Bitterbrush Plant Community: This phase has developed due to improper grazing management, uncontrolled hoof/foot traffic or other soil disturbing activities and no fire. An increase in canopy cover of sagebrush and bitterbrush contributes to a sparse herbaceous understory. Available pollinator habitat is reduced as is the diversity and number of insects with the loss of grasses and forbs. The reptile community is represented by leopard lizard, short horned lizard, sagebrush lizard, western rattlesnake and western skink. The reduction of grasses and forbs in the plant community would reduce the available prey species and cover for these resident reptile species. Fewer prey species and less understory cover results in limited food, brood-rearing and nesting habitat for bird species. Key shrub-steppe obligate bird species include Brewer's sparrow, sage sparrow and sage thrasher and may benefit from the increase in sagebrush. Quality of sage-grouse habitat would be reduced with an increase in bitterbrush and reduction of herbaceous understory. Seasonal (spring, summer and fall) forage habitat for mule deer and elk would be reduced due to loss in vigor and amounts of grasses and poor condition antelope bitterbrush stands. Thermal cover and young of year cover would be provided at this site. Quality of winter habitat for mule deer and elk would be reduced due to the poor quality of antelope bitterbrush stands. Small mammal populations would be similar to Phase 1.1. Pikas may be present in areas with adjacent open rocky habitat. The deer mouse is beneficial to this site as it is the principal vector for planting bitterbrush seed.

State 2 –Canby Bluegrass/ Cheatgrass Plant Community:

This state has developed due to frequent fires, improper grazing management, severe hoof/foot traffic or uncontrolled soil surface disturbing activities. Invasive herbaceous plants and patches of root sprouting shrubs like rabbitbrush can be present. With the loss of forbs the plant community does not support a diverse insect community. If rabbitbrush is present it would enhance fall seasonal pollinator habitat. Native reptile species identified in Phase 1 are not supported with food, water or cover. This plant community does not support the habitat requirements for sage thrasher, Brewer's sparrow, sage-grouse or sage sparrow. Diversity of grassland avian species is reduced due to poor cover and available food. Birds of prey including hawks and falcons may range throughout these areas looking for prey species. Mule deer and elk may utilize the herbaceous vegetation in the early part of the year when Canby bluegrass and 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. Poor cover for small mammals would allow more predation and the plant community would favor grass seed eating mammal species.

Grazing Interpretations.

This site is not well suited to livestock grazing due to unstable soils that can severely move down slope from hoof action.

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

The site has limited opportunities for hunting, hiking, photography, and nature study.

Wood products

None.

Other products

None.

Other information

Field Offices

Mountain Home, ID

Gooding, ID

Fairfield, 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

Brendan Brazee, State Rangeland Management Specialist, NRCS, Idaho

Jim Cornwell, Range Management Specialist, IASCD

Kristen May, Resource Soil Scientist, NRCS, Idaho

Lee Brooks, Range Management Specialist, IASCD

Type locality

Location 1: Butte County, ID	
General legal description	Within the Craters of the Moon National Monument.

References

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

Other references

Hironaka, M., M.A. Fosberg, A. H. Winward. 1983. Sagebrush-Grass Habitat Types of Southern Idaho. University of Idaho, Moscow, Idaho. Bulletin Number "35".

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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

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	06/23/2009
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

- 1. Number and extent of rills:** rills do not occur on this site.

- 2. Presence of water flow patterns:** water-flow patterns do not occur on this site.

- 3. Number and height of erosional pedestals or terracettes:** pedestals do not occur on this site. Terracettes do not occur in the traditional sense (caused by water movement), but can develop due to dry raveling or foot/hof action. They are not extensive.

- 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 15-30 percent. Most of the area absent of plants or litter is cinders.

- 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:** none of these occur due to gravelly surface.

- 7. Amount of litter movement (describe size and distance expected to travel):** fine and coarse litter generally does not move. Gravels on the surface and shrub cover help reduce fine litter movement.

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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 3 to 5 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):** No data.
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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** infiltration is good regardless of plant cover due to the cinder surface. Tall shrubs catch blowing 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):** compaction layer is not present.
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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**
- Dominant: cool season deep-rooted perennial bunchgrasses
- Sub-dominant: 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):** little decadence is expected in shrubs or grasses with normal fire cycle, but decadence can occur in the absence of fire longer than the normal fire frequency. 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 less than 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 1100 pounds per acre (1222 kilograms per hectare) in a year with normal temperatures and precipitation. Perennial grasses produce 50-60 percent of the total production, forbs 10-20 percent, shrubs 25-35 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 bulbous bluegrass, rush skeletonweed, musk and scotch thistle, and diffuse and spotted knapweed. Cheatgrass can invade the site at the lower elevations.

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