

Ecological site R043BY016ID

Shallow Gravelly

16-22 PZ ARAR8/FEID

Last updated: 2/03/2020

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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): 043B–Central Rocky Mountains

Major Land Resource Area (MLRA): 43B – Central Rocky Mountains – This MLRA is extensive including Montana, Idaho, Wyoming and a small portion in Utah. MLRA 43B includes the Rocky Mountains. A revision of the MLRA's in 2006 lead to the inclusion of the foothills with the mountains for much of Wyoming. Cartographic standards limited the ability to capture the foothills as a separate MLRA . Further information regarding MLRAs, refer to: United States Department of Agriculture, Natural Resources Conservation Service. 2006. 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. Available electronically at: http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/ref/?cid=nrcs142p2_053624#handbook.

Classification relationships

Artemisia arbuscula/ Festuca idahoensis HT in "Hironaka, M., M.A. Fosberg, A. H. Winward. 1983. Sagebrush-Grass Habitat Types of Southern Idaho. University of Idaho, Moscow, Idaho. Bulletin Number "35".

Ecological site concept

Site does not receive any additional water. Soils are: not saline or saline-sodic. moderately deep, deep, with >35% stone (10-25") and boulder (>25") cover. skeletal within 20" of soil surface, fragment percentage increasing with depth not strongly or violently effervescent in surface mineral 10". textures usually range from very fine sandy loam to clay loam in surface mineral 4". Slope is 30%. Clay content is = 35% in surface mineral 4". Site does not have an argillic horizon with > 35% clay.

Associated sites

R043BY009ID	Loamy 16-22 PZ ARTRV/FEID
R043BY013ID	South Slope Loamy 16-22 PZ ARTRV/FEID

Table 1. Dominant plant species

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

Physiographic features

This site occurs on nearly level to gently sloping outwash fans. Slopes are generally less than six percent and can occur on all aspects. Elevations range from 6300 to 7500 feet (1920-2300 meters).

Table 2. Representative physiographic features

Landforms	(1) Alluvial fan (2) Outwash fan
Elevation	1,920 – 2,290 m
Slope	0 – 30 %
Water table depth	150 cm
Aspect	Aspect is not a significant factor

Climatic features

The Central Rocky Mountains range in elevation from 6000 to 10000 feet above sea level with some peaks reaching over 12000 feet. The average annual precipitation, based on 10 long term climate stations located throughout the MLRA , is 21 inches. The annual average minimum is 18 and the annual average maximum recorded is 24 inches. The annual average temperature is 41.7 degrees Fahrenheit. The annual average low is 26.7 and the annual average high is 56.7 degrees F. The frost free period ranges from 58 to 80 days while the freeze free period ranges from 90 to 116 days.

Table 3 Representative climatic features

Frost-free period (average)	80 days
Freeze-free period (average)	120 days
Precipitation total (average)	610 mm

Influencing water features

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

Soil features

The soils on this site usually have thin, light colored surface colors with more than 35 percent rock fragments. The surface layer textures are generally sandy loams. Typically, the underlying material is sandy and has greater than 60 percent rock fragments. The soils are excessively drained and very deep with sand and gravel at shallow depths. Permeability is moderately rapid to very rapid and available water capacity is very low. Runoff is slow and water erosion is slight. These soils are characterized by cryic temperature and xeric moisture regimes.

Soil Series Correlated to this Ecological Site

Castlepeak

Table 4. Representative soil features

Surface texture	(1) Very gravelly sandy loam (2) Gravelly
Drainage class	Excessively drained
Permeability class	Moderately rapid to very rapid
Soil depth	150 cm
Surface fragment cover <=3"	30 – 60 %
Surface fragment cover >3"	10 – 40 %
Available water capacity (0-101.6cm)	2.29 – 5.33 cm
Calcium carbonate equivalent (0-101.6cm)	Not specified
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	5.1 – 10
Subsurface fragment volume <=3" (Depth not specified)	10 – 50 %
Subsurface fragment volume >3" (Depth not specified)	40 – 60 %

Ecological dynamics

The dominant visual aspect of the site is low sagebrush and Idaho fescue. Composition by weight is approximately 60-70 percent grasses, 10-20 percent forbs, and 15-25 percent shrubs.

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

Fire has historically occurred on the site at intervals of 80-100 years.

The Historic Climax Plant Community (HCPC), the Reference State (State 1), moves through many phases depending on the natural and man-made forces that impact the community over time. State 1, described later, indicates some of these phases. The Reference Plant Community Phase is Phase A. This plant community is dominated by Idaho fescue in the understory and low sagebrush in the overstory. Subdominant species include bottlebrush squirreltail, rose pussytoes, longleaf phlox, buckwheat, and Hoods phlox. There is a large variety of other forbs and some other shrubs that can occur in minor amounts. The plant species composition of Phase A is listed later under "Reference Plant Community Phase Plant Species Composition".

Total annual production is 600 pounds per acre (672 kilograms per hectare) in a normal year. Production in a favorable year is 900 pounds per acre (1008 kilograms per hectare). Production in an unfavorable year is 400 pounds per acre (448 kilograms per hectare). Structurally, cool season deep rooted perennial bunchgrasses are very dominant, followed by low shrubs being about equal to perennial forbs while shallow rooted perennial bunchgrasses are subdominant.

FUNCTION:

This site is suited for grazing by domestic livestock in late spring, summer, and fall. This site provides fair to good habitat for various upland wildlife. Pronghorn use the site in late spring, summer, and fall. This site offers minimal recreation value, however, some use may be made by an occasional hunter or hiker. Due to the gravelly soils the site is fairly resistant to disturbances that can potentially degrade it.

Impacts on the Plant Community.

Influence of fire:

This site historically had a very low fire frequency, approximately every 80-100 years. Most of the shrubs evolved in the absence of fire, therefore they can be severely damaged or killed when burned. Idaho fescue can be lost with fire. Rabbitbrush and other root-sprouting shrubs can increase after fire. Annual grasses and forbs can be troublesome invaders on this site after fire, preventing perennial grass and shrub re-establishment and increasing the fire frequency.

Influence of improper grazing management:

Season-long grazing and/or excessive utilization can be detrimental to this site. This type of management leads to reduced vigor of Idaho fescue and other deep-rooted perennial bunchgrasses. With reduced vigor, recruitment of these species declines. As these species decline, the plant community becomes susceptible to an increase in low sagebrush and/or an invasion of noxious and invasive species.

Continued improper grazing management influences fire frequency by increasing fine fuels. If cheatgrass or other annual grasses increase due to improper grazing management and they become co-dominant with Nevada bluegrass and other annuals, fires become more frequent.

Proper grazing management that addresses frequency, duration, and intensity of grazing can keep fine fuels from developing, thereby reducing fire frequency. Proper grazing management also maintains the integrity of the plant community.

Weather influence:

Above normal precipitation in April, May, and June can dramatically increase total annual production. These weather patterns can also increase viable seed production of desirable species to provide for recruitment. Extended periods of drought significantly impact this site due to the soils low available water holding capacity (AWC). Extended drought reduces vigor of the perennial grasses and shrubs. Extreme drought may cause plant mortality. Prolonged drought can lead to a reduction in fire frequency.

Influence of Insects and disease:

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

Influence of noxious and invasive plants:

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. Annual grasses and forbs can be very invasive on this site, especially after fire. Once they become established the fire frequency increases. As a result, the shrub component can be lost.

Influence of wildlife:

Relatively low numbers of wildlife use this site and have little impact on it. Pronghorn antelope is the dominant large herbivore using the site. They use the site yearlong but prefer it in the spring, fall, and early winter. Winter and spring use by mule deer occurs occasionally.

Watershed:

Decreased infiltration and increased runoff occurs when low sagebrush is removed with frequent fires, particularly the year following the fire event. The increased runoff also increases sheet and rill erosion. The long-term effect is a transition to a different state.

When the hydrologic condition of the vegetative cover is good, natural erosion hazard is slight.

Plant Community and Sequence:

Transition pathways between common vegetation states and phases.

State 1.

Phase A to B. Develops with fire. Fire only occurs in above normal precipitation about every 80-100 years.

Phase A to C. Develops under improper grazing management and no fire.

Phase B to A. Develops under prescribed grazing management program and no fire.

Phase C to A. Develops from prescribed grazing management and no fire.

State 1, Phase B to State 2. Results from continued improper grazing management and/or frequent fire. This site has crossed the threshold. It is not economical to return this site to State 1 with accelerating practices.

State 1, Phase C to State 3. Results from continued improper grazing management and no fire. This site has crossed the threshold. It is not economical to return this site to State 1 with accelerating practices.

State 2 to State 3. Develops from continued improper grazing management and no fire. Both states have crossed the threshold. It is not economical to return either of these states to State 1 with accelerating practices.

State 3 to State 2. Results from fire. Both states have crossed the threshold. It is not economical to return either of these states to State 1 with accelerating practices.

State 2 to Unknown Site. Excessive soil loss and changes in the hydrologic cycle caused by continued improper grazing management and fire causes this state to cross a threshold and retrogress to a new site with reduced potential. It is not economical to return this site to State 1 with accelerating practices.

State 3 to Unknown Site. Excessive soil loss and changes in the hydrologic cycle caused by continued improper grazing management. Frequent fire may also have played a role. The potential of the site has been lost and it crosses a threshold and retrogresses to a new unknown site. It is not economical to return this site to State 1 with accelerating practices.

Practice Limitations.

Slight limitations exist for implementing vegetative management and facilitating practices. Early spring grazing should be avoided due to prolonged wetness in the soil. Severe limitations exist for rangeland seeding due to droughty, gravelly soils and low precipitation during the periods of plant growth.

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 6. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 5.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 10. Community 6.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Animal community

Wildlife Interpretations. Animal Community – Wildlife Interpretations This rangeland ecological site provides habitat for select native wildlife species. Large herbivore use of the reference plant community is dominated by mule deer, elk, and pronghorn antelope. Site can provide critical winter habitat for these large herbivores. The rangeland provides important seasonal habitat for resident and migratory animals including western toad, common sagebrush lizard, shrews, bats, jackrabbits, ground squirrels, mice, coyote, red fox, badger, sage-grouse, Ferruginous hawk, prairie falcon, horned lark, and western meadowlark. Sage-grouse, sharp-tailed grouse, Great Basin pocket mouse, and Idaho pocket gopher are area sensitive species that may be present on this site. In isolated areas encroachment of noxious and invasive plant species (cheatgrass and medusahead) can replace native plant species which provide critical forage, brood-rearing, and nesting cover for a variety of native wildlife. Water is limited, being provided only by seasonal runoff, artificial water catchments, and spring sites. State 1 Phase 1.1 – Low Sagebrush/ Idaho Fescue/ Bottlebrush Squirreltail Plant Community (HCPC): 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 western rattlesnake, common sagebrush lizard, leopard frog, and western toad. 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. Birds that may be resident or migratory include mountain bluebird, lazuli bunting, vesper sparrow, and grasshopper sparrow. Brood-rearing, winter cover, and winter food habitat for sage grouse is provided by this diverse plant community. Low sagebrush is a preferred winter food for sage-grouse. The plant community provides spring, fall, and winter forage needs for large mammals including mule deer, elk, and antelope. Mule deer have a preference for low sagebrush. A diverse small mammal population may include golden-mantled ground squirrels, chipmunks, and Idaho pocket gopher. State 1 Phase 1.2- Bottlebrush Squirreltail/ Idaho Fescue Plant Community: This phase has developed due to fire. The plant community, dominated by herbaceous vegetation with little or no sagebrush provides less vertical structure for animals. Insect diversity would be reduced with the loss of sagebrush but a native forb plant community similar to that in State 1 Phase 1.1 would still support select pollinators. Establishment of rabbitbrush would add fall pollinator habitat to the site. As rabbitbrush matures it would replace the loss of structural diversity in the plant community. Habitat quality for reptiles would decline with the loss of sagebrush. The dominance of herbaceous vegetation with no sagebrush canopy cover would eliminate use of this area for nesting, winter cover, and winter food for sage-grouse. This plant community provides limited brood-rearing habitat for sage-grouse if site is adjacent to sagebrush cover. The dominant herbaceous vegetation improves habitat for grassland avian species (horned lark and western meadowlark). Winter forage for large mammals would be reduced or eliminated with the loss of low sagebrush. Quality of habitat for small mammals would be reduced due to loss of cover and an increase in hunting success by predators. State 1 Phase 1.3- Low Sagebrush/ Sandberg Bluegrass Plant Community: This phase has developed due to improper grazing management and no fire. The animal community would be similar to the one in State 1 Phase 1.1. The reduced vigor and canopy cover of forbs would lower the quality of the habitat for pollinators. Reptiles would include common sagebrush lizard and western rattlesnake. The reduced diversity of insects and understory cover may reduce the quality of food and cover for reptiles. The site would provide winter cover and winter food for sage-grouse. The quality of brood-rearing and nesting cover for sage-grouse would decline due to the decline of the herbaceous understory. Mule deer, elk, and pronghorn would utilize the site for winter habitat. The quality of grazing habitat for large herbivores would decline with the loss of native deep rooted perennial grasses. Small mammal species present would be similar to those in State 1 Phase 1.1 State 2 - Bottlebrush Squirreltail/ Cheatgrass / Medusahead Plant Community: This plant community is the result of continued improper grazing management and fire. The reduced forb and shrub components in the plant community would support a very limited population of pollinators. Most reptilian species identified in State 1 Phase 1.1 are not supported with food, water, or cover. This plant community does not support the habitat requirements for sage-grouse. 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. Hunting success by raptors may increase. 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 forage and cover habitat. Small mammal populations and diversity would be reduced due to poor quality cover, food, and an increase in hunting success by predators. State 3 – Low Sagebrush/ Annuals/ Forbs Plant Community: This state has developed due to improper grazing management and no fire. The loss of native understory vegetation will reduce insect diversity on the site. The lack of flowering plants reduces season long habitat for pollinators like butterflies and moths. Reptilian species present would be similar to the State 1 Phase 1.1 reptile community, but the

quality of habitat (food and cover) would decline, reducing populations. This plant community does not support the habitat requirements for sage-grouse. The plant community provides limited winter forage for mule deer, elk, and pronghorn. Spring and fall forage habitat for large herbivores would decline due to loss of native grasses and the increase in cheatgrass. Small mammal species present would be similar to those in State 1 Phase 1.1 but the quality of cover and forage habitat would decline. Grazing Interpretations. This site is suited for grazing by domestic livestock in late 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

Soils on this site are in hydrologic group A. The runoff potential is low.

Recreational uses

This site offers minimal recreation value.

Wood products

None

Other products

None

Other information

Field Offices Arco, ID Cascade, ID Challis, ID Nezperce, ID Emmett, ID Grangeville, ID Gooding, ID Lewiston, ID Mountain Home, ID Orofino, ID Salmon, ID Shoshone, ID St. Anthony, ID Weiser, 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 Bruce Knapp, Resource Soil Scientist, NRCS, Idaho Lee Brooks, Range Management Specialist, IASCD

Type locality

Location 1: Blaine County, ID	
General legal description	NE 1/4

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".

USDA Forest Service, Rocky Mountain Research Station. 2004. Restoring Western Ranges and Wildlands. General Technical Report RMRS-GTR-136-vols. 1-3.

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

USDA, Forest Service, Fire Effects Information Database. 2004. www.fs.fed.us/database.

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

Approval

Scott Woodall, 2/03/2020

Rangeland health reference sheet

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

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

Indicators

1. **Number and extent of rills:** rills rarely occur on this site. They are most likely to occur immediately following a wildfire. Gravels, cobbles, and stones on the surface reduce erosion.

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

3. **Number and height of erosional pedestals or terracettes:** neither occurs on the site.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** bare ground ranges from 20-40 percent but additional data is needed.

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: blowouts and depositional areas are usually not present. Immediately following wildfire some soil movement may occur on lighter textured soils.

7. Amount of litter movement (describe size and distance expected to travel): fine litter in the interspaces may move up to 2-3 feet or further following a significant run-off event. High winds can also move fine litter. Coarse litter generally does not move.

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

9. Soil surface structure and SOM content (include type of structure and A-horizon color and thickness): Structure ranges from weak fine to very fine granular. Soil organic matter (SOM) ranges from 1 to 3 percent. The A or A1 horizon is typically 1 to 3 inches thick and is dark brown or dark yellowish brown when moist.

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.

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

12. Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):

Dominant: cool season bunchgrasses

Sub-dominant: perenial forbs shrubs

Other:

Additional:

13. Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence): some decadence in Idaho fescue is expected to occur on this site in the absence of ungulate grazing and/or fire. Mortality can occur due to low water holding capacity of the soil following extended drought.

14. Average percent litter cover (%) and depth (in): annual litter cover in the interspaces will be 5-10 percent to a depth of <0.1ft. Fine litter can accumulate under the shrubs.

15. Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production): is 600 lbs. per acre in a year with normal precipitation and temperatures. Perennial grasses produce 60-70 percent of the total, forbs 10-20 percent, and shrubs 15-25 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, soft chess, ventenata, bulbous bluegrass, medusahead, tarweed, curlycup gumweed, spotted and diffuse knapweed and yellow star-thistle.
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17. Perennial plant reproductive capability: all functional groups have the potential to reproduce in normal years.
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