USDA Natural Resources
Conservation Service

Ecological site R012XY024ID
Subalpine Slope Loamy 20+ PZ ARTRS2/FEID

Last updated: 9/22/2020
Accessed: 05/21/2025

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): 012X–Lost River Valleys and Mountains

Land Resource Region: B (Northwestern Wheat and Range)
MLRA: 12 (Lost River Valleys and Mountains)

EPA EcoRegion: Level III (Middle Rockies)

LRU notes

012X-Lost River Valleys and Mountains

Precipitation or Climate Zone: 20+” P.Z.
https://soils.usda.gov/survey/geography/mlra/index.html

Classification relationships

Artemisia vaseyana “spiciformis”/ Bromus carinatus HT and Artemisia vaseyana “spiciformis”/ Carex geyeri 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 additional water.
Soils are:
Not saline or saline-sodic.

Moderately deep to deep, with >35% (by volume) coarse fragments, skeletal within 20” of the soil surface.
Not strongly or violently effervescent in the to 20” of the soil profile.
textures usually range from loam to silt 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

R012XY021ID	**Loamy 16-22 PZ ARTRV/FEID**
R012XY025ID	**Shallow Subalpine 16+ PZ ARART/FEID**

Similar sites

R012XY021ID	**Loamy 16-22 PZ ARTRV/FEID**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata ssp. spiciformis*
Herbaceous	(1) *Festuca idahoensis*

Physiographic features

This site occurs on high elevation mountain slopes generally over 20 percent. It can occur on all aspects which are somewhat protected from winds. In most winters there is considerable snow accumulation. Elevations range from 7800 to 9250 feet (2364-2800 m).

Table 2. Representative physiographic features

Landforms	(1) Mountain slope
Flooding frequency	None
Ponding frequency	None
Elevation	7,800–9,250 ft
Slope	20%
Aspect	Aspect is not a significant factor

Climatic features

MLRA 12 is dominated by dramatic changes in elevation which, in turn, influence local weather patterns. The intermontane valleys have elevations as low as 3800 feet, while the adjacent mountains may reach more than 12,600 feet. The average annual precipitation for the entire MLRA, based on 10 long term climate stations located throughout the MLRA, is approximately 9.38 inches. However, the dry valleys may have averages as low as 6 inches, while the upper peaks may have averages that exceed 46 inches per year. Temperatures vary considerably over the year. The average annual temperature is 42.25 degrees F. The average low is 27.4 degrees while the average high temperature is 57 degrees.

In the summer the sun shines 78% of the time, but drops to 40% in the winter. The prevailing wind is location-dependent, and generally flows parallel to the orientation of the dominant valleys. In the summer localized afternoon upslope winds and evening downslope winds are common. The average windspeed is greatest in the spring and early summer.

The frost free period ranges from 102 to 107 days while the freeze free period ranges from 134 to 139 days across the MLRA.

Table 3. Representative climatic features

Frost-free period (average)	107 days
Freeze-free period (average)	139 days
Precipitation total (average)	11 in

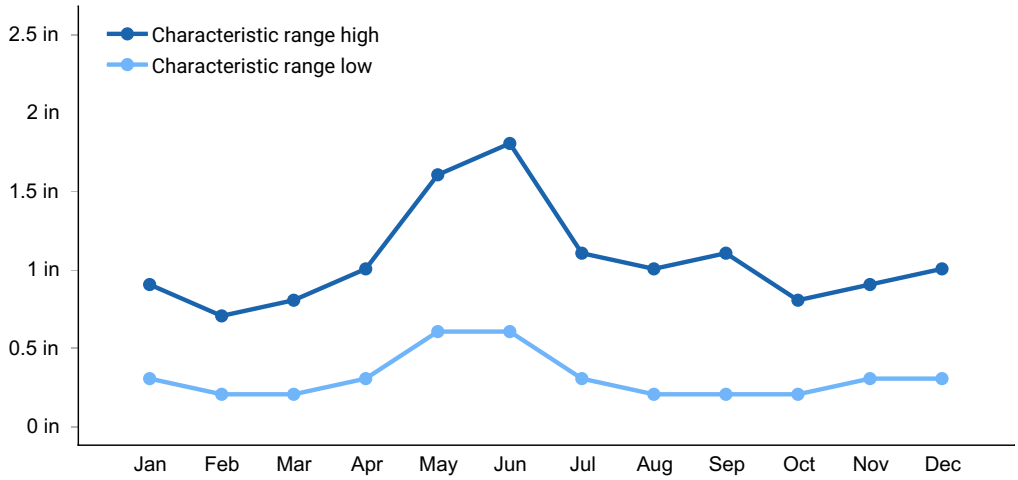


Figure 1. Monthly precipitation range

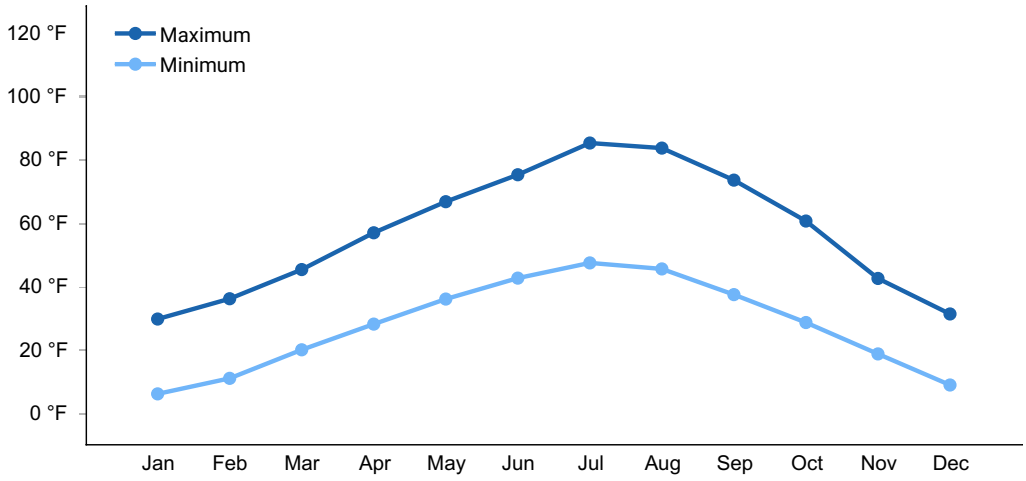


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

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

Soil features

The soils on this site are moderately deep to deep, well drained very gravelly loams and silt loams. These soils have a high ash influence. The soils are derived from volcanic, granitic or meta-sedimentary sources. Infiltration and internal drainage is moderate. The available water holding capacity (AWC) is high. Erosion hazard is high when vegetation is scarce or has been removed.

Table 4. Representative soil features

Surface texture	(1) Very gravelly loam (2) Silt loam

Ecological dynamics

Ecological Dynamics of the Site:

The dominant visual aspect of this site is relatively uniform stand of perennial forbs, subalpine big sagebrush, Idaho fescue, and bluebunch wheatgrass. Composition by weight is approximately 20-30 percent grasses, 40-50 percent forbs and 25-35 percent shrubs.

During the last few thousand years, this site has evolved in an arid climate characterized by cool summers and very cold winters. Herbivory has historically occurred on the site at low levels of utilization. Herbivores include Rocky Mountain elk, mule deer, lagomorphs, and small rodents. Fire has historically occurred on this site every 20-50 years.

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. The HCPC is Phase A. This plant community is dominated by Idaho fescue, mountain brome, and subalpine big sagebrush. The plant species composition of Phase A is listed later under “HCPC Plant Species Composition”.

Total annual production is 1425 pounds per acre (1596 Kg/ha) in a normal year. Production in a favorable year is 1600 pounds per acre (1792 Kg/ha). Production in an unfavorable year is 1000 pounds per acre (1120 Kg/ha). Structurally, perennial forbs are very dominant, followed by medium height shrubs and deep- rooted perennial grasses being about equal.

Note: The ecology of subalpine big sagebrush is not well understood. Two habitat types with subalpine big sagebrush are identified by Hironaka. One has mountain brome and Idaho fescue dominant in the understory. The other has elk sedge as the dominant plant in the understory. With deterioration of this habitat type, elk sedge is replaced by Idaho fescue, western needlegrass, and mountain brome.

Subalpine big sagebrush is the only big sagebrush that reproduces by layering. Wambolt and Frisina, 2002, report that it also reproduces by root-sprouting.

It has also been reported by USDA-NRCS that subalpine big sagebrush is believed to be a stabilized hybrid between mountain big sagebrush and silver sagebrush (*Artemisia cana* Pursh ssp. viscidula. Beetle).

FUNCTION:

This site is suited for grazing by domestic livestock in the summer and early fall. This site has limited value for wildlife due to lack of cover and distance to water. Due to the surface gravels on this site it is fairly resistant to disturbances that can potentially degrade the site. The soils on this site are in hydrologic group C. When ground cover is at or near potential, the erosion hazard is slight to moderate, but when vegetative cover is scarce or has been removed, the erosion hazard is high. This site has good values for aesthetics and recreational hiking. The site is located on elevated areas with a view of the valleys and canyons below.

Impacts on the Plant Community.

Influence of fire:

In the absence of normal fire frequency, shrubs will gradually increase. Rocky Mountain juniper can invade the site if a seed source is in the proximity. Grasses and forbs decrease as shrubs increase. With the continued absence of fire, juniper can displace most of the shrubs and other understory species. See “Influence of juniper invasion” below. Douglas

fir may invade the site in the absence of fire.

When fires become more frequent than historic levels (20-50 years), subalpine big sagebrush is reduced. With continued short fire frequency, subalpine big sagebrush can be significantly reduced along with many of the desirable understory species such as mountain brome and Idaho fescue. These species may be replaced by Kentucky bluegrass along with a variety of annual and perennial forbs including noxious and invasive plants. Mountain snowberry and rabbitbrush may increase.

Influence of improper grazing management:

Season-long grazing and/or excessive utilizationcan be very detrimental to this site. This type of management leads to reduced vigor of the bunchgrasses. With reduced vigor, recruitment of these species declines. As these species decline, the plant community becomes susceptible to Rocky Mountain juniper invasion, an increase in subalpine big sagebrush and noxious and invasive plants.

Continued improper grazing management influences fire frequency by increasing fine fuels. As fine fuels increase, fires become more frequent.

Proper grazing management that addresses frequency, duration, and intensity of grazing can also keep fine fuels from developing, thereby reducing fire frequency. This can lead to gradual increases in subalpine big sagebrush and/or Rocky Mountain juniper. A planned grazing system can be developed to intentionally accumulate fine fuels in preparation for a prescribed burn. Any brush management should be carefully planned, as a reduction in shrubs without a suitable understory of perennial grasses can cause an increase in fine fuels which will lead to more frequent fire intervals.

Weather influences:

Above normal precipitation in May, June and July can 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 reduce total annual production and be detrimental to viable seed production. Overall plant composition is normally not affected when perennials have good vigor.

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. An outbreak of a particular insect is usually

influenced by weather but no specific data for this site is available. Mormon cricket and grasshopper outbreaks occur periodically. Outbreaks seldom cause plant mortality since defoliation of the plant occurs only once during the year of the outbreak.

Influence of noxious and invasive plants:

There are few noxious and invasive species adapted to this high elevation site. These species can add to the fine-fuel component and lead to increased fire frequency. Perennial and annual 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 summer and early fall. Their numbers are seldom high enough to adversely affect the plant community.

Watershed:

Decreased infiltration and increased runoff occur with the invasion of Rocky Mountain juniper. Juniper invasion can be triggered by lack of fire, poor grazing management, and prolonged drought. The 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.

Influence of juniper invasion:

The following discussion deals with Rocky Mountain juniper.

In plant communities that are invaded by juniper, the species has a competitive advantage for the following reasons:
• Juniper is very drought tolerant.
• It has the ability to extract soil moisture from a wide range of soil depths.
• Juniper has high evapo-transpiration rates.
• The species intercepts rain and snow before it reaches the soil surface.
• It has the ability to grow as long as there is soil moisture and the temperature is above freezing.
• Juniper has a relatively rapid growth rate and is long-lived. It can readily over-top shade intolerant
species which leads to mortality.
• Nutrient cycling is reduced.
As the canopy closes, juniper gains control of energy capture. As juniper extracts water, other plants are unable to acquire sufficient water and nutrients to sustain growth and reproduction, thus reducing cover and biomass in the interspaces. After the canopy closes, there is sufficient soil moisture available for shallow-rooted, shade tolerant species to persist directly under the tree.

The following hydrological impacts occur on sites invaded by juniper:
• Infiltration in the interspaces is reduced.
• Run-off increases resulting in increased sheet and rill erosion with elevated sediment loads.
• Soil temperatures increase in the interspaces which results in accelerated drying of the soil surface.
• Increased bare ground in the interspaces.
• Soil moisture storage is reduced.

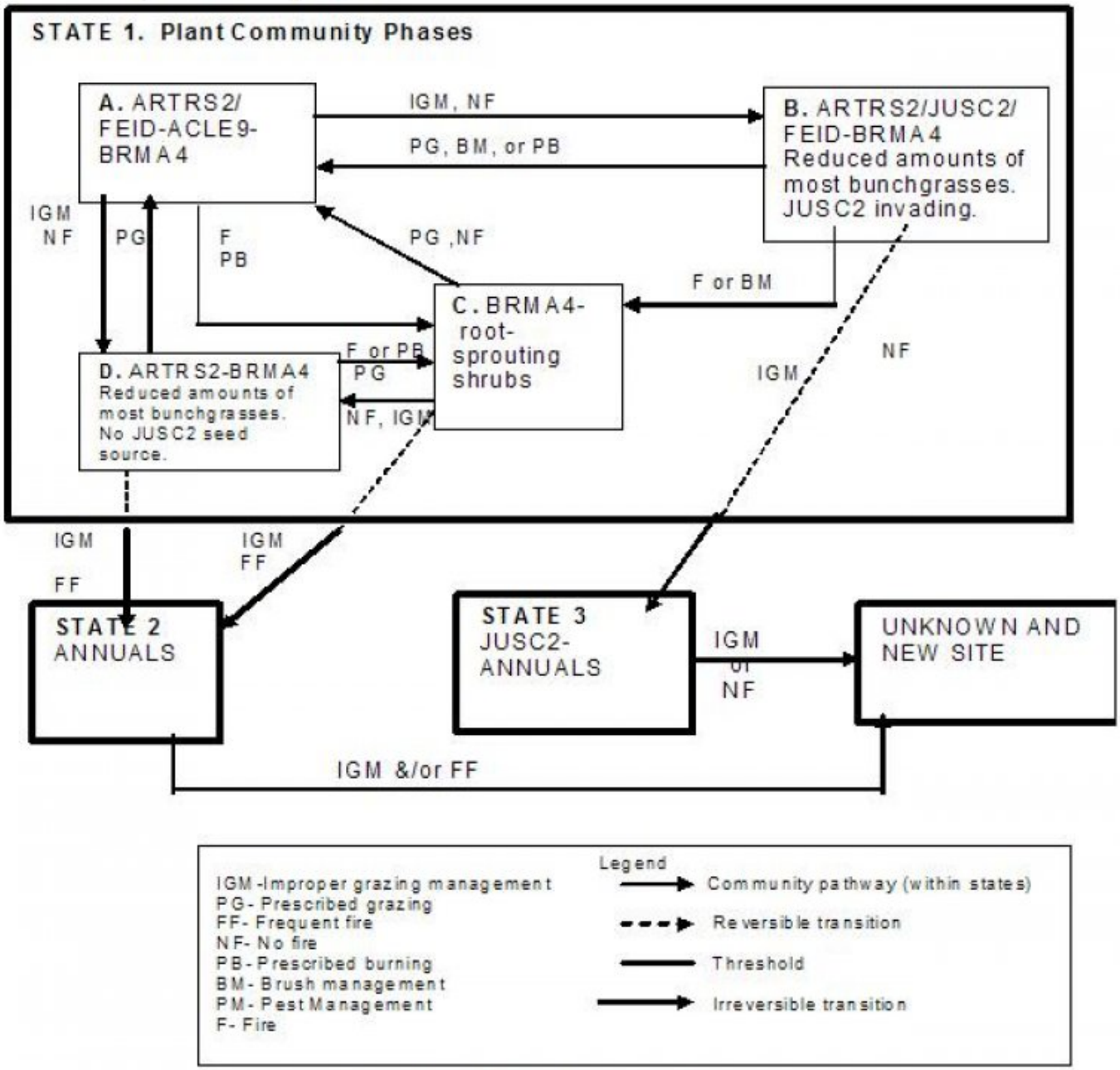
As bare ground and interconnectiveness of bare ground increases, flow rates are accelerated (reduction of flow sinuosity) and run-off out of the area increases.

Degradation of these systems can result in the formation of a feedback cycle in which greater juniper cover and density results in greater plant and soil disturbance between the canopies.

In summary, a closed juniper community takes control of the following ecological processes: hydrology, energy capture, and nutrient cycling. The changes are primarily driven by the hydrological processes. The development of a closed juniper canopy always results in a transition across the threshold to a different state. Generally, when juniper canopy cover nears 20%, the plant community is approaching the threshold.

State and transition model

The Reference State (State 1), the Historic Climax Plant Community (HCPC), moves through many phases depending on the natural and man-made forces that impact the community over time. The Reference Plant Community Phase is Phase A, State 1. The plant species composition of Phase A is listed later under "Reference Plant Community Phase Plant Species Composition".



PLANT LEGEND STATES 1,2, & 3
ARTRS2- Subalpine Big Sagebrush
JUSC2 - Rocky Mountain Juniper
FEID - Idaho Fescue
BRMA4 - Mountain Brome
ACLE9 - Letteman's Needlegrass

State 1
State 1, Plant community A. Historic Climax Plant Community (HCPC).

Community 1.1
State 1, Plant community A. Historic Climax Plant Community (HCPC).

The HCPC is dominated by subalpine big sagebrush in the overstory with Idaho fescue,Letterman’s needlegrass and mountain brome in the understory. Subdominant species include bluebunch wheatgrass, prairie junegrass, and Wyeth buckwheat. A wide variety of other grasses, forbs and shrubs occur in small amounts. Natural fire frequency is 20-50 years.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Forb	450	625	720
Shrub/Vine	300	425	480
Grass/Grasslike	250	375	400
Total	**1000**	**1425**	**1600**

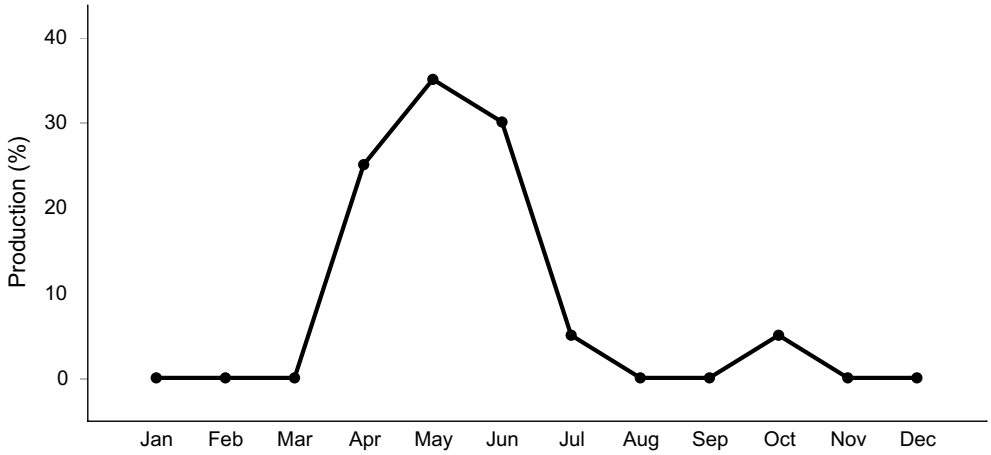


Figure 4. Plant community growth curve (percent production by month). ID0705, ARTRV–PSSPS-FEID. State 1.

Additional community tables

Animal community

Wildlife Interpretations.
Animal Community – Wildlife Interpretations

This rangeland ecological site provides diverse habitat for many native wildlife species. The plant community exhibits a diverse mixture of forbs throughout the growing season offering excellent habitat for invertebrates. Mule deer, bighorn sheep, and elk may utilize the site during the year. The site provides seasonal habitat for resident and migratory animals including western toad, shrews, bats, ground squirrels, mice, coyote, red fox, badger, Ferruginous hawk, and prairie falcon. Area sensitive bird species include Brewer’s sparrow, sage thrasher, sage sparrow, and sage-grouse. Water features are sparse provided by seasonal runoff, artificial water catchments, and springs.

State 1 Phase 1.1 –Subalpine Big Sagebrush/ Idaho Fescue/ Letterman's Needlegrass/ Mountain Brome 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 is represented throughout the growing season leading to a diverse insect community. Many avian and mammal species utilize this habitat based on the availability of invertebrate prey species. The reptile and amphibian community is represented by leopard lizard, short horned lizard, western skink, western toad, and northern leopard frog. Amphibians are associated with springs and isolated water bodies adjacent to this plant community. Development of spring sites that collect all available water would exclude amphibian use on these sites. Native shrub-steppe obligate avian species utilizing the habitat include the Brewer's sparrow, sage sparrow, and sage thrasher. Sage-grouse habitat (brood-rearing and winter) is provided by this plant community. The plant community provides seasonal forage and cover for large mammals including mule deer, bighorn sheep, and elk. Idaho fescue and bluebunch wheatgrass are important forage species for these large mammals. A diverse small mammal population including golden-mantled ground squirrels, jackrabbits, deer mice, Great Basin Kangaroo rat, and chipmunks would utilize this plant community. Pikas may utilize the site if it is adjacent to talus slopes at higher elevations.

State 1 Phase 1.2- Subalpine Big Sagebrush/ Rocky Mountain Juniper/ Idaho Fescue/ Mountain Brome Plant Community: This plant community is the result of improper grazing management and fire frequency being much longer than normal. An increase in canopy cover of sagebrush and juniper contributes to a sparse herbaceous understory. A reduced herbaceous understory results in lower diversity and numbers of insects. The reptile community will be similar to State 1 Phase 1.1 community represented by leopard lizard, short horned lizard, sagebrush lizard, and western skink. The reduced diversity of insects and understory cover may reduce the quality of food and cover for reptile populations. As juniper increases, quality of habitat for Brewer's sparrow, sage thrasher, and sage sparrow may increase. Remaining sagebrush provides brood-rearing, winter cover, and winter food for sage-grouse but as juniper encroachment occurs the quality of this habitat is severely reduced or eliminated. The plant community provides spring, summer, and fall habitat for mule deer, elk, and bighorn sheep. As juniper encroaches, the site will provide additional thermal cover for large mammals. A small mammal population similar to State 1 Phase 1.1 is present, including golden-mantled ground squirrels, jackrabbits, deer mice, Great Basin Kangaroo rat, and pikas (when talus slopes are adjacent to site).

State 1 Phase 1.3 – Mountain Brome/ Root Sprouting Shrubs Plant Community: The plant community is a result of recent wildfire or prescribed burning. The plant community, dominated by herbaceous vegetation with little or no sagebrush would provide less vertical structure for animals. Patches of root sprouting shrubs (rabbitbrushes) may be present to provide limited vertical structure for wildlife. Insect diversity would be reduced but a native forb plant community similar to State 1 Phase 1.1 would still support select pollinators. Reptiles including leopard lizard and short horned lizard would be limited or excluded due to the loss of sagebrush. Amphibian habitat would be tied to permanent spring sites in the area. Development of spring sites that collect all available water would exclude the use of

amphibians on these sites. The dominance of herbaceous vegetation with patches of rabbitbrush would limit or exclude nesting by Brewer's sparrow, sage sparrow, and sage thrasher. The herbaceous vegetation improves habitat for grassland avian species (horned lark, savannah sparrow, vesper sparrow, and western meadowlark). Mule deer and elk use would be seasonal but the site would offer little thermal or young of year cover due to the loss of shrubs. The populations of small mammals would be dominated by species that prefer grass seed and open habitat. Large blocks of this plant community would fragment the reference plant community and severely reduce the quality of habitat for shrub-steppe obligate animal species.

State 1 Phase 1.4 – Subalpine Big Sagebrush / Mountain Brome 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. The reduced herbaceous understory results in lower diversity of insects. The reptile community is represented by leopard lizard, short horned lizard, sagebrush lizard, and western skink. The reduced diversity of insects may reduce reptile diversity and populations. The lack of an herbaceous understory is a key factor in limiting the use of this plant community by avian species. Key shrub-steppe obligate avian species include Brewer's sparrow, sage sparrow, sage thrasher, and sage-grouse. Quality of brood-rearing habitat for sage-grouse is reduced due to a less diverse herbaceous plant community. Winter habitat (cover and food) for sage-grouse is provided. The reduced vigor of understory vegetation provides a shorter forage season for mule deer and elk. Young of year cover would be provided for mule-deer. Small mammal diversity and populations would be similar to State 1 Phase 1.1.

State 2 – Annuals Plant Community:
This community has developed due to continued improper grazing management and frequent fire. The plant community does not support a diverse insect community. The lack of forbs and shrubs in the plant community would support a very limited population of pollinators. Most reptilian species 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. Large mammals may utilize the herbaceous vegetation in the early part of the year when the invasive annuals (cheatgrass) are more palatable. The populations of small mammals would be dominated by open grassland species. Large blocks of this plant community would fragment the reference plant community and reduce the quality of habitat for shrub-steppe obligate animal species.

State 3 - Rocky Mountain Juniper / Annuals 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 use by pollinators like butterflies and moths. Quality of habitat for reptilian species identified in State 1 Phase 1.1 is reduced. This plant community does not support the habitat requirements for sage-grouse. Birds using this site as resident or migratory habitat include Juniper titmouse, western bluebird, and Virginia's warbler. The Juniper titmouse relies

heavily on juniper seeds for winter food. Hunting success by raptors may decrease due to a heavy overstory of juniper. The plant community provides limited seasonal habitat for mule deer, elk, and bighorn sheep in spring and fall. As juniper encroaches, the site will provide additional thermal and young of year cover for large mammals.

Grazing Interpretations.

This site is suited for grazing by domestic livestock in the summer and early 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

The soils on this site are in hydrologic group C. When ground cover is at or near potential the erosion hazard is slight to moderate, but when it is scarce or has been removed the erosion hazard is high

Recreational uses

This site has good values for aesthetics and recreational hiking. The site is located on elevated areas with a view of the valleys and canyons below. It offers some hunting, horseback riding, and photographic opportunities. Off-road vehicle and snowmobile use can also occur.

Wood products

None

Other products

None

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
Joe May, State Rangeland Management Specialist, NRCS, Idaho
Lee Brooks, Range Management Specialist, IASCD

Other references

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

Approval

Kendra Moseley, 9/22/2020

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	03/29/2007
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills: rarely occur on this site due to the gravelly, stony surface soils.

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2. **Presence of water flow patterns:** Water-Flow Patterns: rarely occur on this site. When they do occur they are short and disrupted by forbs, cool season grasses, shrubs and surface stones. They are not extensive.

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3. **Number and height of erosional pedestals or terracettes:** Pedestals and/or Terracettes: are rare but can occur on the site especially where flow patterns are present and on the steepest slopes of the site.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare Ground: ranges from 30-40 percent but additional data is needed.

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5. **Number of gullies and erosion associated with gullies:** Gullies: do not occur on this site.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** Wind-Scoured, Blowouts, and/or Deposition Areas: generally does not occur since the site usually lies in protected areas. Surface gravels and vegetation also protect the soil from wind erosion.

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7. **Amount of litter movement (describe size and distance expected to travel):** Litter Movement. fine litter in the interspaces typically moves up to three feet or further. Fine litter can be moved by both wind and water. Coarse litter generally does not move.

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

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil Surface Loss or Degradation: The A or A1 horizon is typically 4 to 15 inches thick. Structure ranges from weak very fine granular to moderate fine granular. Soil organic matter (SOM) ranges from 1 to 8 percent.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Effect of plant community on infiltration: Forbs, bunchgrasses and shrubs slow runoff and increase infiltration. Shrubs accumulate 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: 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: Functional/ Structural Groups: perennial forbs>deep-rooted bunchgrasses= shrubs.

Sub-dominant:

Other:

Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Plant Mortality/ Decadence: very little mortality or decadence is expected on this site. Mortality of shallow rooted grasses may occur due to an increase in subalpine big sagebrush.

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14. **Average percent litter cover (%) and depth (in):** Litter Amount: additional data is needed but is expected to be low and at a shallow depth.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Annual Production: is 1425 pounds per acre (1596 Kg/ha) in a year with normal precipitation and temperatures. Perennial grasses produce 20-30 percent of the total production, forbs 40-50 percent and 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:** Invasive Plants: Kentucky bluegrass and leafy spurge.

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17. **Perennial plant reproductive capability:** Reproductive Capability of Perennial Plants: all functional groups have the potential to reproduce in normal years.