

Ecological site R012XY001ID Limy Gravelly 8-13 PZ ARNO4/PSSPS

Last updated: 9/21/2020
Accessed: 05/18/2024

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: 8-13" P.Z.

<https://soils.usda.gov/survey/geography/mlra/index.html>

Classification relationships

Artemisia nova / *Agropyron spicatum* 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 very deep, with >35% (by volume) gravels and cobbles, skeletal within 20" of soil surface. strongly or violently effervescent throughout 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

R012XY003ID	Saline Flat <8 PZ ATGA/ACHY
R012XY017ID	Shallow Fractured South 8-12 PZ ARTRW8/PSSPS-LESAS2
R012XY018ID	Saline Loamy 8-11 PZ SAVE4/LECI4
R012XY023ID	Dry Meadow PONE3-PHAL2
R012XY026ID	Dry Loamy 7-10 PZ ATCO-ARFR4/PSSPS

R012XY032ID	Loamy 8-12 PZ ARTRW8/PSSPS
R012XY036ID	Clayey 7-10 PZ ARTRW8-ATCO/PSSPS
R012XY041ID	Gravelly 7-10 PZ ATCO/SPCR

Similar sites

R012XY040ID	Cold Gravelly 8-12 PZ ARNO4/HECOC8
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Table 1. Dominant plant species

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

Physiographic features

This site occurs on mountain slopes on all aspects. Slopes generally range from 0 to 60 percent. Elevations ranges from 4800 to 8000 feet (1463-2438 meters).

Table 2. Representative physiographic features

Landforms	(1) Mountain slope
Elevation	1,463–2,438 m
Slope	0–60%

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)	279 mm

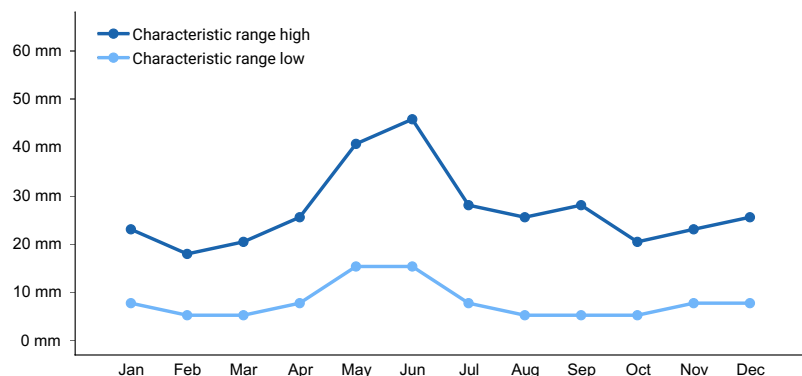


Figure 1. Monthly precipitation range

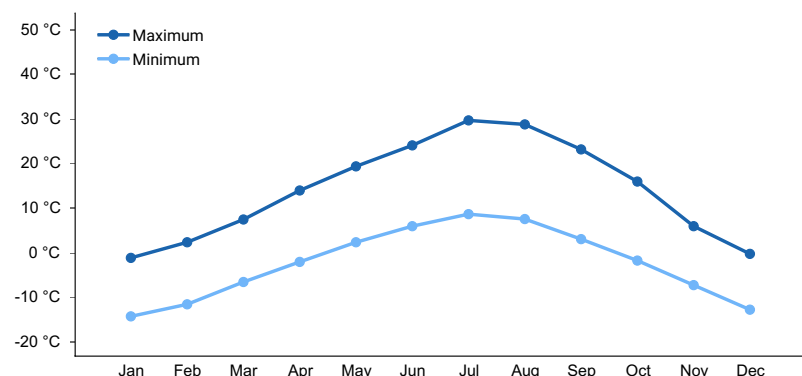


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

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

Soil features

The soils of this site are loams to extremely gravelly loams. They can be stony, bouldery and mildly alkaline or carbonic. An indurated hardpan can occur at varying depths from 7 to 20 inches. Gravels often exceed 60 percent by volume below 12 inches in depth. The parent material is alluvium and colluvium from metamorphic and sedimentary rocks, heavily influenced by limestone. These soils are cold (47 degrees mean annual soil temperature). The soils are well drained and have a rapid to very rapid permeability class. Available water capacity is very low to low. The moisture supplying capacity of the soils is limited by the depth to the duripan or bedrock. Water erosion can be high when the plant cover is reduced and slope increases. These soils are characterized by an aridic soil moisture regime or an aridic bordering on xeric. The soil temperature regime is either frigid or cryic.

Table 4. Representative soil features

Surface texture	(1) Gravelly loam (2) Very gravelly silt loam (3) Stony
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderately slow to moderately rapid
Soil depth	25–152 cm
Surface fragment cover ≤3"	10–40%
Surface fragment cover >3"	0–10%
Available water capacity (0–101.6cm)	1.52–12.45 cm

Calcium carbonate equivalent (0-101.6cm)	0–65%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–5
Soil reaction (1:1 water) (0-101.6cm)	6.6–9
Subsurface fragment volume <=3" (Depth not specified)	30–60%
Subsurface fragment volume >3" (Depth not specified)	30–60%

Ecological dynamics

The dominant visual aspect of this site is black sagebrush, bluebunch wheatgrass and Salmon wildrye. Composition by weight is approximately 55 to 65 percent grass, 5 to 15 percent forbs and 25 to 35 percent shrubs.

In the last few thousand years, this site has evolved in an arid climate characterized by warm, dry summers and cold winters. Herbivory has historically occurred on the site at low levels of utilization. Herbivores include pronghorn antelope, mule deer, Rocky Mountain elk, lagomorphs and small rodents. Fire has historically occurred on this site every 80 to 100 years. Fire occurs only in years with above normal precipitation.

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 bluebunch wheatgrass, salmon wildrye and black sagebrush. Subdominant species include Sandberg bluegrass, Hoods phlox, needleleaf phlox and stemless goldenweed. There are a variety of other grasses, forbs and shrubs that occur in the plant community 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 400 pounds per acre (448 Kg/ha) in a normal year. Production in a favorable year is 700 pounds per acre (784 Kg/ha). Production in an unfavorable year is 300 pounds per acre (336 Kg/ha). Structurally, cool season deep rooted perennial bunchgrasses are dominant, followed by medium height shrubs being more dominant than perennial forbs while shallow rooted bunchgrasses are subdominant.

FUNCTION:

This site provides yearlong range for pronghorn antelope. Mule deer make slight use in mild winters and moderate to heavy use in severe winters. Only in severe winters do Rocky Mountain elk use this site on the lower slopes. Raptors hunt the site and it provides nesting for birds such as the horned lark.

It is suited for livestock use in the spring, early summer and fall, and recreational use in the summer and fall.

This site is not easily degraded by improper grazing management due to relatively steep slopes and gravelly to stony surfaces.

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. Bluebunch wheatgrass and salmon wildrye are usually maintained in the community. Sandberg bluegrass, thickspike wheatgrass and bottlebrush squirreltail can increase in the community with fire. With fires more frequent than the historic levels (80-100 years), annuals, invasive and noxious perennials can invade the plant community. Cheatgrass can be a troublesome invader at lower elevations on this site after fire, preventing perennial grass and shrub re-establishment and increasing the fire frequency. Utah juniper can invade the site if a seed source is in the proximity. See “Influence of juniper invasion” below.

Influence of improper grazing management:

Black sagebrush, spiny hopsage and winterfat can all be impacted by improper grazing management. Relatively low levels of utilization by cattle and sheep are needed to maintain the shrub component. Utah juniper can invade the site also if a seed source is nearby.

Weather influences:

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 shallowness of the soil and its' low water holding capacity. Extended drought reduces vigor of the perennial grasses and palatable shrubs. Extreme drought may cause plant mortality. An early, hard frost can occasionally kill some plants.

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. 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. Shadscale saltbush can be heavily impacted by the scale insect, *Orthezia annae*. It is also called "mealy bug". This insect is moved by ants from one plant to another and feeds on the roots of shadscale saltbush. It can cause stand mortality, especially when plants are stressed following a series of drought years.

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. Cheatgrass can be very invasive on this site, especially after fire and at lower elevations. Once it becomes 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 that uses the site. They use the site yearlong but prefer it in the spring, fall and early winter. Sage grouse use the site for strutting grounds. Mule deer occasionally use the site in the winter and spring.

Watershed:

Decreased infiltration and increased runoff occur when black 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 is slight.

Influence of juniper invasion:

The following discussion deals with Utah 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.

Plant Community and Sequence:

Transition pathways between common vegetation states and phases:

State 1.

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

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

Phase C to A. Develops under a good prescribed grazing management program and no fire.

Phase B to A. Develops from prescribed grazing and no fire.

State 1, Phase B to State 2. Develops with frequent fire and/or improper grazing management. The site has crossed the threshold. It is not economical to return this plant community to State 1 with accelerating practices.

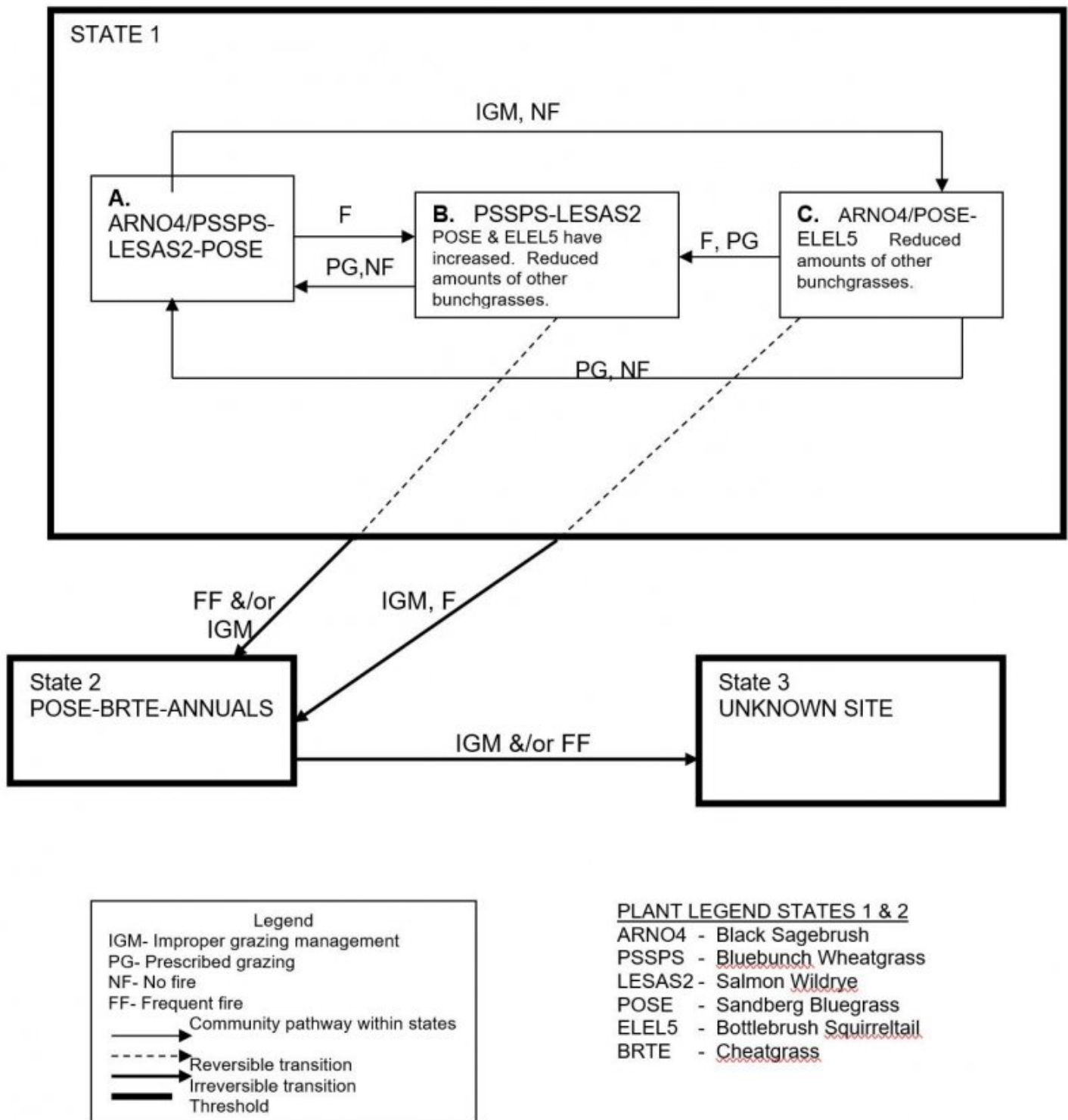
State 1, Phase C to State 2. Develops with continued improper grazing management and fire. The site has crossed the threshold. It is not economical to return this plant community to State 1 with accelerating practices.

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

Practice Limitations:

There are moderate to severe limitations for vegetative management, facilitating and accelerating practices due to moderately steep to steep slopes.

State and transition model



State 1

State 1, Phase A. Reference Plant Community Phase

Community 1.1

State 1, Phase A. Reference Plant Community Phase

This plant community is dominated by black sagebrush, bluebunch wheatgrass and salmon wildrye. Subdominant species include Sandberg bluegrass, Hoods phlox, needleleaf phlox and stemless goldenweed. There are a variety of other grasses, forbs and shrubs that occur in the plant community in minor amounts. Natural fire frequency is approximately 80 to 100 years. Fire only occurs in favorable years.

State 2

State 1, Phase B

Community 2.1

State 1, Phase B

This plant community has developed after a fairly recent fire. The fire intolerant shrubs such as black sagebrush have been significantly reduced or eliminated. Rabbitbrush may have re-sprouted. Bluebunch wheatgrass and salmon wildrye are maintained in the stand. Other deep-rooted perennial bunchgrasses have been reduced and some have been killed by the fire. Sandberg bluegrass and bottlebrush squirreltail have increased. Some cheatgrass may have invaded at lower elevations.

State 3

State 1, Phase C

Community 3.1

State 1, Phase C

This plant community has developed due to improper grazing management and no fire. Bluebunch wheatgrass and other deep rooted perennial bunchgrasses have been significantly reduced in amounts and are in low vigor. Sandberg bluegrass and bottlebrush squirreltail have increased as well as some shrubs. Black sagebrush has probably increased. Under severe sheep or wildlife use in the fall or winter, black sagebrush can decrease. Most other shrubs have increased.

State 4

State 2

Community 4.1

State 2

The site has degraded into a plant community dominated by Sandberg bluegrass, cheatgrass and annual grasses and forbs. Fine fuels are adequate to carry a fire in favorable years. Frequent fires and/or improper grazing management have caused the degradation from Phase B State 1 to State 2. It can also be reached from Phase C State 1 with improper grazing management and fire. Excessive soil loss has not occurred at this point but the site has crossed the threshold. It is not economical to return this plant community to State 1 with accelerating practices.

State 5

Unknown new site

Community 5.1

Unknown new site

This plant community has gone over the threshold to a new site. Site potential has been reduced. Significant soil loss has occurred. Infiltration has been reduced and run-off has become more rapid. This community has developed due to continued improper grazing management and/or fire. It is not economical to return this plant community to State 1 with accelerating practices.

Additional community tables

Animal community

Wildlife Interpretations.

Animal Community – Wildlife Interpretations

This rangeland ecological site provides habitat for select native wildlife species who can tolerate cold sites high in elevation with a sparse plant community. The plant community exhibits a diverse mixture of forbs throughout the short growing season offering excellent habitat for invertebrates. Mule deer, antelope, and elk are the large

herbivores using the site. The rangeland habitat provides seasonal habitat for resident and migratory animals including western toad, sagebrush lizard, shrews, ground squirrels, mice, coyote, red fox, badger, sage-grouse, Ferruginous hawk, prairie falcon, horned lark, and western meadowlark. Sage-grouse, Merriam's shrew, and Idaho pocket gopher are area sensitive species in this plant community. Encroachment of noxious and invasive plant species (cheatgrass) in isolated areas can replace native plant species which provide critical 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 –Black Sagebrush/ Bluebunch Wheatgrass/ Salmon Wildrye/ Sandberg Bluegrass Reference Plant Community (RPC) This plant community provides a diversity of grasses, forbs, and shrubs used throughout the growing season by native insect communities that assist in pollination. The reptile and amphibian community is represented by leopard lizard, short horned lizard, sagebrush lizard, western skink, western 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. Sage-grouse may utilize this plant community for nesting, winter food, and cover. The plant community provides important forage for large mammals including mule deer, antelope, and elk in the spring, winter, and fall. A small mammal population including golden-mantled ground squirrels, Wyoming ground squirrel, Merriam's shrew, Idaho pocket gopher, and yellow-bellied marmots utilize this community.

State 1 Phase 1.2 –Sandberg Bluegrass/ Forbs Plant Community: This plant community is the result of fire. The plant community, dominated by herbaceous vegetation would provide less vertical structure for animals. Patches of root sprouting shrubs (rabbitbrushes) may be present and provide limited vertical structure for wildlife. Insect diversity would be reduced due to reduced shrub cover but a native forb plant community would still support select pollinators. Rabbitbrush may provide fall pollinator habitat in the future. Reptiles including short horned lizard and sagebrush 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. Winter cover and winter forage use by sage-grouse is eliminated. The dominance of herbaceous vegetation improves habitat for grassland avian species (horned lark and western meadowlark). Large mammal (mule deer, elk, and antelope) use for forage would be limited to herbaceous vegetation in the spring and fall.

State 1 Phase 1.3- Black Sagebrush/ Sandberg Bluegrass/ Bottlebrush Squirreiltail 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 reduced diversity and numbers of insects. The reptile and amphibian community is represented by leopard lizard, short horned lizard, sagebrush lizard, western skink, and western toad. The reduction of grasses and forbs in the plant community would reduce the available prey species and cover for these resident reptiles. 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. Fewer prey species and sparse understory cover results in limited food, brood-rearing, and nesting habitat for avians. Winter cover and winter food for sage-grouse is available. Reduced understory vegetation would lower spring and fall forage value for deer, antelope, and elk. Winter browse for deer and antelope would still be available. A small mammal population including golden-mantled ground squirrels, Merriam's shrew, Idaho pocket gopher, and yellow-bellied marmots would utilize this community.

State 2 – Sandberg Bluegrass/ Cheatgrass / Annuals Plant Community:

This plant community is the result of continued improper grazing management and frequent fire. Invasive herbaceous plants and patches of root sprouting shrubs like rabbitbrushes can be present. The reduced forb and shrub component 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-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. Large mammals may utilize the herbaceous vegetation in the early part of the year when the invasive annuals (cheatgrass) are more palatable. At other times of the year large mammals would not regularly utilize these areas due to poor food and cover conditions.

Grazing Interpretations.

This site is best adapted for livestock grazing in the spring, early summer and fall. Natural water supplies are short or absent, and livestock water may have to be piped, hauled or otherwise made available.

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 B. They have moderately low runoff potential.

Recreational uses

Antelope hunting is the major recreational use of this site. There are limited opportunities for hiking, horseback riding and photography.

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

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Lee Brooks, Range Management Specialist, IASCD

Kristen May, Resource Soil Scientist, NRCS, Idaho

Other references

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

Approval

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.

Author(s)/participant(s)	
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Date	01/23/2008
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

- 1. Number and extent of rills:** A few rills may occur on this site in areas where surface gravels or stones are not present.

- 2. Presence of water flow patterns:** Water-flow patterns can occur on this site - particularly where surface gravels or stones are not present in a large enough area to disperse flows. When they do occur, they are short and disrupted by cool season grasses, shrubs and surface stones and gravels. They are not extensive.

- 3. Number and height of erosional pedestals or terracettes:** A few pedestals can be expected where rills and water flow patterns are present. They are not extensive. Terracettes are rare.

- 4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground ranges from 10 to 20 percent.

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

- 6. Extent of wind scoured, blowouts and/or depositional areas:** Wind scoured, blowouts and/or depositional areas usually not present in the HCPC.

- 7. Amount of litter movement (describe size and distance expected to travel):** Fine litter in the interspaces typically moves 2 to 3 feet. Coarse litter generally does not move.

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Values should range from 3-5 but need to be tested.
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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Structure ranges from weak or moderate very fine, fine granular, to weak thin or medium platy, to weak or moderate very fine, fine or medium subangular blocky. The A or A1 horizon is typically 2 to 12 inches thick. Soil organic matter (SOM) ranges from 0.5 to 3 percent.
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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Bunchgrasses, especially deep rooted perennial species, slow runoff and increase infiltration. Gravels and stones on surface slow surface runoff and increase infiltration. Medium height shrubs accumulate some snow in the interspaces.
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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** 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> medium shrubs>
- Sub-dominant: Perennial forbs>shallow rooted bunchgrasses
- Other:
- Additional:
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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Very little mortality or decadence is expected on this site. Mortality of shallow rooted grasses may occur due to extended periods of drought.
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14. **Average percent litter cover (%) and depth (in):** Additional data is needed but is expected to be low and at a shallow depth.
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Annual production is 400 pounds per acre (448 Kg/ha) in a year with normal precipitation and temperatures. Perennial grasses produce 55-65 percent of the total production, forbs 5-15 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 species includes cheatgrass at lower elevations, clasping pepperweed, beggar ticks, tansymustard, Jim Hill tumbledustard, yellow salsify and halogeton.

17. **Perennial plant reproductive capability:** All functional groups have the potential to reproduce in normal and favorable years.
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