USDA Natural Resources
Conservation Service

Ecological site R012XY036ID
Clayey 7-10 PZ ARTRW8-ATCO/PSSPS

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: 7-10” P.Z.
https://soils.usda.gov/survey/geography/mlra/index.html

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) coarse fragments, Not skeletal within 20” of the soil surface.
Not strongly or violently effervescent in the to 20” of the soil profile.
textures usually range from clay loam to clay in surface mineral 4”.
Slope is < 30%.
Clay content is = >35% in surface mineral 4”.

Associated sites

R012XY026ID	**Dry Loamy 7-10 PZ ATCO-ARFR4/PSSPS**

Similar sites

R012XY034ID	**Clayey 12-16 PZ ARARL/FEID**

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata ssp. wyomingensis* (2) *Atriplex confertifolia*
Herbaceous	(1) *Pseudoroegneria spicata ssp. spicata*

Physiographic features

This site occurs on hills and ridges of lacustrine sediments. It occurs on all aspects and elevation ranges from 4000 to 6000 feet (1200-1850 meters). Slopes range from 1-10 percent.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Ridge
Elevation	1,219–1,829 m
Slope	1–10%

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

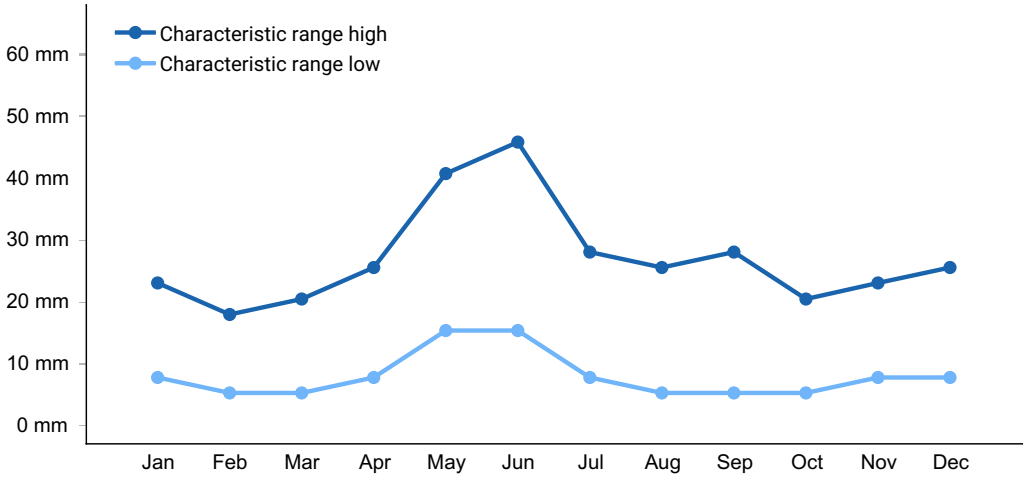


Figure 1. Monthly precipitation range

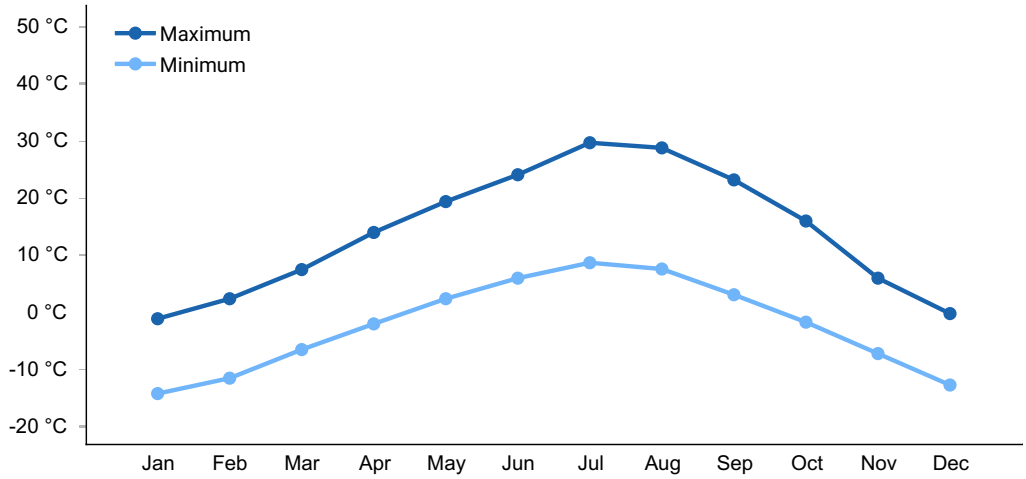


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

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

Soil features

The soils on this site have surface textures of slit loams to gravelly silt loams. The subsoil has clay loam, silty clay loam and clay textures. The soils are very deep. A claypan occurs

at a depth of 4 to 17 inches which severely restricts water and root penetration. These soils are high in salts and gypsum material. Due to the claypan there is no permeability of the soil, while the horizons above the claypan are moderately well drained. The available water holding capacity of the soil is low to moderate. Water erosion could be high if the vegetation layer is reduced and the slope increases. The soils have an aridic soil moisture regime. The soil temperature regime is frigid.

Table 4. Representative soil features

Surface texture	(1) Very gravelly silt loam
Drainage class	Moderately well drained
Permeability class	Not specified
Soil depth	152 cm
Surface fragment cover <=3"	0–25%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	10.67–20.07 cm
Calcium carbonate equivalent (0-101.6cm)	0–5%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	2–6
Soil reaction (1:1 water) (0-101.6cm)	7.9–9
Subsurface fragment volume <=3" (Depth not specified)	0–5%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

The dominant visual aspect of the site is Wyoming big sagebrush and shadscale saltbush in the overstory with bluebunch wheatgrass in the understory. The composition by weight is 50-60 percent grasses, 5-15 percent forbs and 30-40 percent shrubs.

During the last few thousand years, this site has evolved in an arid climate characterized by dry summers and cold, wet winters. Herbivory has historically occurred on this site at low levels of utilization. Herbivores include mule deer, rocky mountain elk, lagomorphs 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 Wyoming big sagebrush and shadscale saltbush in the overstory and bluebunch wheatgrass in the understory. Subdominant species include Sandberg bluegrass, Indian ricegrass, bottlebrush squirreltail, needle and thread, Hoods phlox and milkvetch. The plant species composition of Phase A is listed later under “Reference Plant Community Phase Plant Species Composition”.

Total annual production is 350 pounds per acre (436 kilograms per hectare)in a normal year. Production in a favorable year is 600 pounds per acre (673 kilograms per hectare). Production in an unfavorable year is 200 pounds per acre (224 kilograms per hectare). Structurally, cool season deep rooted perennial bunchgrasses are dominant, followed by medium shrubs being more dominant than perennial forbs while shallow rooted perennial bunchgrasses are subdominant.

FUNCTION:
This site is suited for livestock grazing in late spring after the soil begins to dry. Wildlife depend on Wyoming big sagebrush for food and cover throughout the year. Succulent grasses and forbs are high protein food sources in the spring. The site provides year-long habitat for pronghorn antelope and is very important for summer range and fawning habitat in mid-spring. Some mule deer use occurs during the summer. Wintering sage grouse, pronghorn antelope and small mammals occur throughout the site. Songbirds such as horned lark and meadowlark nest on the site.

The site has high runoff potential.

Recreation values on this site include pronghorn antelope and upland game bird hunting and some camping sites. The site is mostly open space with a sagebrush aspect providing many prime areas from which to view the surrounding mountains.

Due to the non-stony surface, clayey soils, and flat slopes, this site is easily degraded by improper grazing management.

Impacts on the Plant Community.

Influence of fire:
In the absence of normal fire frequency, Wyoming big sagebrush can gradually increase on the site. Grasses and forbs decrease as shrubs increase. With the continued absence of fire, Wyoming big sagebrush can displace many of the primary understory species.

When fires become more frequent than historic levels (80-100 years), Wyoming big sagebrush and shadscale saltbush are reduced significantly. Green rabbitbrush can increase slightly. With continued short fire frequency, Wyoming big sagebrush and

shadscale saltbush can be completely eliminated along with many of the desirable understory species such as bluebunch wheatgrass and Indian ricegrass. These species may be replaced by Sandberg bluegrass along with a variety of annual and perennial forbs including noxious and invasive plants. Cheatgrass and/or medusahead will invade the site. These fine fuels will increase the fire frequency.

Influence of improper grazing management:

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

Continued improper grazing management influences fire frequency by increasing fine fuels. As cheatgrass and/or medusahead increase and become co-dominant with Sandberg bluegrass and other annuals, 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 Wyoming big sagebrush. 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 increase cheatgrass and/or medusahead which will lead to more frequent fire intervals and the resulting loss of valuable wildlife habitat.

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 effected 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:
Mormon crickets 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 following a series of drought years.

Influence of noxious and invasive plants:
Many of these species 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 all seasons. Their numbers are seldom high enough to adversely affect the plant community. Burrowing rodents can create microsites for establishment of noxious and invasive plant species.

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

Plant Community and Sequence:
Transition pathways between common vegetation states and phases:
State 1.
Phase A to B. Develops with improper grazing management and in the absence of fire.
Phase A to C. Develops with fire.
Phase B to A. Develops with prescribed grazing and no fire.
Phase C to A. Develops with prescribed grazing and no fire.

State 1 Phase C to State 2. Develops through frequent fire and/or improper grazing management. This site has crossed the threshold. It is economically impractical to return this plant community to State 1 with accelerating practices.

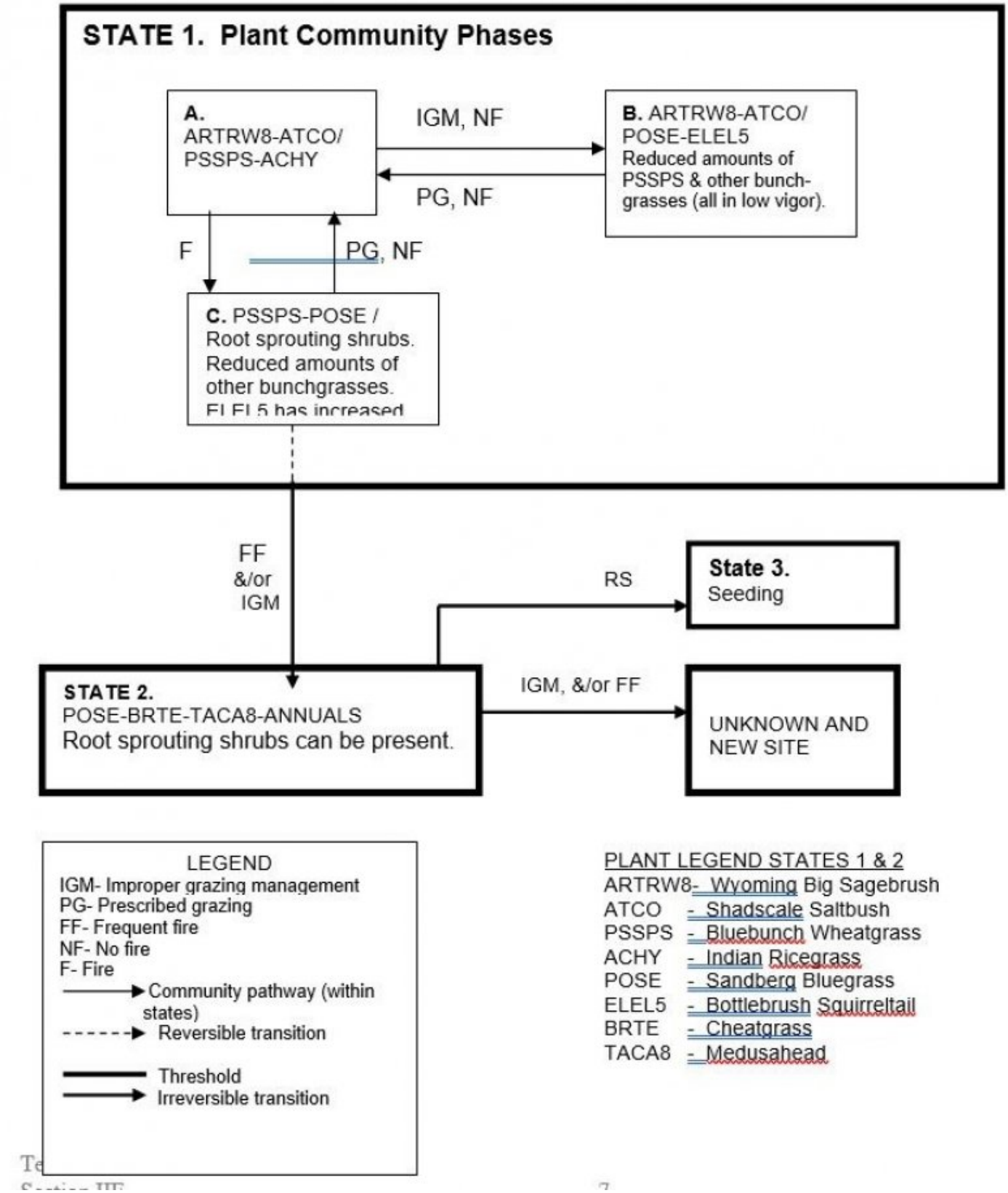
State 2 to 3. Results from range seeding.

State 2 to unknown site. Excessive soil loss and changes in the hydrologic cycle caused by continued improper grazing management and/or frequent fire cause this state to cross a threshold and retrogress to a new site with reduced potential. It is economically impractical to return this plant community to State 1 with accelerating practices.

Practice Limitations.

Slight to moderate limitations exist on this site for implementing vegetative management and facilitating practices. Grazing when the soils are wet can lead to compaction and erosion problems. Moderate to severe limitations exist for implementing accelerating practices. Clay soils and low annual precipitation require certain precautions be followed when planning range seeding. The site contains significant amounts of shrubs that are important to wildlife.

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 has Wyoming big sagebrush and shadscale saltbush in the overstory with bluebunch wheatgrass dominating the understory. Subdominant species include Indian ricegrass, Sandberg bluegrass, bottlebrush squirreltail, needle and thread, Hoods phlox and milkvetch. Natural fire frequency is 80-100 years.

State 2
State 1, Phase B

Community 2.1
State 1, Phase B

This plant community is dominated by Wyoming big sagebrush and shadscale saltbush with reduced amounts of bluebunch wheatgrass and other deep-rooted bunchgrasses. Sandberg bluegrass and bottlebrush squirreltail have increased in the understory. All deep-rooted bunchgrasses are typically in low vigor. Wyoming big sagebrush has increased. Shadscale saltbush is hedged. This state has developed due to improper grazing management and lack of fire. Some cheatgrass and medusahead may have invaded the site.

State 3
State 1, Phase C

Community 3.1
State 1, Phase C

This plant community is dominated by bluebunch wheatgrass, Sandberg bluegrass and root-sprouting shrubs. Bottlebrush squirreltail has increased. Forbs remain about in the same proportion as Plant Community A. Wyoming big sagebrush and shadscale saltbush have been reduced significantly due to wildfire. Some cheatgrass and medusahead may have invaded the site. This plant community is the result of wildfire.

State 4
State 2

Community 4.1
State 2

This plant community is dominated by Sandberg bluegrass, cheatgrass, medusahead and other annuals. Root sprouting shrubs such as rabbitbrush and horsebrush can be present, dependent upon, how frequent, fire has occurred. Some soil loss has occurred. This state has developed due to frequent fires and/or improper grazing management. This site has crossed the threshold. It is economically impractical to return this plant community to State 1 with accelerating practices.

State 5
State 3

Community 5.1
State 3

This plant community results from range seeding. The seeding may be introduced species or it may be made up of native species that attempt to mimic the historic plant community.

State 6
Unknown new site

Community 6.1
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 state has developed due to continued improper grazing management and/or frequent fires. 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 rangeland ecological site provides diverse habitat for many native wildlife species. Large herbivore use of this ecological site is dominated by mule deer, pronghorn antelope, and elk. Important seasonal habitat is provided for resident and migratory animals including western toad, sagebrush lizard, western rattlesnake, shrews, bats, jackrabbits, ground squirrels, mice, coyote, red fox, badger, sage-grouse, Ferruginous hawk, prairie falcon, horned lark, and western meadowlark. Area sensitive species may include burrowing owl, pygmy rabbit, Great Basin ground squirrel, Idaho pocket gopher, and Merriam’s shrew. Changes in the plant community composition can reduce the number and diversity of wildlife species in the area. With reduced shrub cover, shrub obligate avian and mammal species become rare including sage-grouse, brewer’s sparrow, sage

thrasher, sage sparrow, and pygmy rabbits. Encroachment of noxious and invasive plant species (cheatgrass, Russian thistle, and knapweed) can replace native plant species which provide food, 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 - Wyoming Big Sagebrush/ Shadscale Saltbush/ Bluebunch Wheatgrass/ Indian Ricegrass Reference Plant Community (RPC): This plant community provides a diversity of grasses, forbs, and shrubs used by native insect communities that assist in pollination. The reptile and amphibian community is represented by leopard lizard, short horned lizard, sagebrush lizard, western skink, western rattlesnake, 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. Shrub-steppe obligate avian species include the Brewer's sparrow, sage sparrow, sage thrasher, and sage-grouse. Critical habitat (brood-rearing, nesting areas, winter cover and food) for sage grouse is provided by this diverse plant community. The plant community supports the seasonal needs of large mammals (mule deer, elk, and pronghorn), providing forage and young of year cover. Wyoming big sagebrush is a preferred browse for large mammals. Shadscale saltbush is used by deer, pronghorn, rodents, game birds, and songbirds. A diverse small mammal population including jackrabbit, deer mouse, Great Basin kangaroo rat, and golden-mantled ground squirrels may utilize this plant community.

State 1 Phase 1.2 - Wyoming Big Sagebrush/ Shadscale Saltbush/ Sandberg Bluegrass/ Bottlebrush Squirreltail Plant Community: This plant community is the result of improper grazing management and a lack of fire. An increase in canopy cover of sagebrush contributes to a sparse herbaceous understory. Grasses, forbs, and shrubs are used by native insects that assist in pollination, but the reduced herbaceous understory results in lower diversity of insects. The reptile community is represented by leopard lizard, short horned lizard, sagebrush lizard, western skink, and western rattlesnake. The reduced diversity and populations of insects will reduce reptile diversity and populations. Reduced 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. Critical habitat (brood-rearing and nesting cover) for sage-grouse is limited due to a less diverse herbaceous plant community. The increase in shrub cover may reduce the quality of the habitat for burrowing owls. The reduced vigor of the understory vegetation provides a shorter forage season for mule deer. Wyoming big sagebrush is a preferred browse for large mammals. Young of year cover would be provided for deer and antelope. A small mammal population including jackrabbit, deer mouse, Great Basin kangaroo rat, and golden-mantled ground squirrels may utilize this plant community. Shadscale saltbush would be hedged and in poor vigor, reducing the quality of forage for deer, antelope, rodents, and songbirds.

State 1 Phase 1.3 - Bluebunch Wheatgrass/ Sandberg Bluegrass Plant Community: This plant community is the result of fire. Large areas of Phase 1.3 would fragment the

reference plant community and would severely reduce the quality of habitat for shrub obligate animal species. The plant community, dominated by herbaceous vegetation with little or no sagebrush provides less vertical structure and limits use by shrub obligate animals. Over time, rabbitbrush and horsebrush may re-sprout and provide limited vertical structure for wildlife. Insect diversity would be reduced due to the loss of brush, but a native forb plant community would still support select pollinators. When established, rabbitbrush would provide fall pollinator habitat. Reptile use, including short horned lizard, sagebrush lizard, and western rattlesnakes, would be limited or excluded due to the absence of sagebrush. The dominance of herbaceous vegetation with little sagebrush canopy cover would reduce or prevent use of these areas for nesting by Brewer's sparrow, sage sparrow, sage thrasher, and sage-grouse. This plant community provides brood-rearing habitat for sage-grouse when sagebrush cover is nearby. The site does not provide suitable winter habitat or nesting cover for sage grouse. The herbaceous vegetation improves habitat for grassland avian species (horned lark and western meadowlark). Large mammal (mule deer, pronghorn) use for foraging would be seasonal, but the site would offer little thermal cover or young of year cover. Some areas would be suitable for burrowing owls. Small mammal diversity would be reduced and the plant community would not provide suitable habitat for pygmy rabbits.

State 2 - Sandberg Bluegrass/ Cheatgrass/ Medusahead and Annuals Plant Community: This plant community is the result of improper grazing management and/or frequent fire. Large areas of State 2 would fragment the reference plant community and would severely reduce the quality of the habitat for shrub obligate species. The loss of the native shrub and herbaceous plant community would not support a diverse insect community. Ants and grasshoppers may dominate the insect community. Most native reptilian species are not supported with food, water, or cover. This plant community does not support the habitat requirements for sage-grouse, sage thrasher, Brewer's sparrow, or sage sparrow. Diversity of bird species is reduced due to poor cover and food. Birds of prey including hawks and falcons may range throughout these areas looking for prey species. Large mammals may utilize the herbaceous vegetation in the early part of the year when the invasive annuals (cheatgrass) are more palatable. At other times of the year large mammals would not regularly utilize these areas due to poor food and cover conditions. Small mammal populations and diversity would be dominated by open grassland species like the Columbian ground squirrel. Hunting success of predators for small mammals would increase with the loss of suitable cover.

State 3 - Range Seeding Plant Community: The seeding mixture (native or non-native) determines the animal species that utilize this site. A diverse seed mixture of grasses and forbs would provide similar habitat conditions as in the herbaceous plant community described in State 1 Phase 1.3. A diverse seed mixture of grasses, forbs, and shrubs would provide similar habitat conditions as described in State 1 Phase 1.1 or 1.2. A monoculture of non-native grass species would not support diverse populations of insects, reptiles, avians, mammals, or sagebrush obligate species. Grassland animal species including western meadowlark, horned lark, savannah sparrow, deer mouse, kangaroo rat, mule deer, and elk would utilize this site for nesting and/or foraging. Birds of prey including

hawks and falcons may range throughout this community looking for prey species. Large areas of State 3 with no shrubs in the plant community would fragment the reference plant community and would severely reduce the quality of the habitat for shrub obligate animal species.

Grazing Interpretations.
This site is suited for livestock grazing in late spring after the soil begins to dry. 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 D. The site has high runoff potential.

Recreational uses

Recreation values on this site include pronghorn antelope and upland game bird hunting and some camping sites. The site is mostly open space with a sagebrush aspect providing many prime areas from which to view the surrounding mountains.

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
Brendan Brazee, State Rangeland Management Specialist, NRCS, Idaho
Lee Brooks, Range Management Specialist, IASCD
Kristen May, Resource Soil Scientist, NRCS, Idaho

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

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.

Author(s)/participant(s)	
Contact for lead author	USDA/Natural Resources Conservation Service Brendan Brazee, State Range Conservationist 9173 W. Barnes Drive, Suite C Boise, ID 83709 (208) 378-5722
Date	01/16/2008
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. If rills are present, they are most likely to occur after a hard rain for several continuous days, rain on frozen ground and immediately following wildfire.

---

2. **Presence of water flow patterns:** Water flow patterns rarely occur on this site except following a hard rain over several continuous days or after a rain on frozen ground event. When they occur, they are short, disrupted by cool season perennial grasses and medium shrubs, and are not extensive.

---

3. **Number and height of erosional pedestals or terracettes:** Pedestals are rare on this site. Do not misinterpret frost heaving for pedestals. Terracettes are rare. Terracettes, when present, provide a favorable micro-site for vegetation establishment which further increases infiltration.

---

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Data not available. On sites in mid-seral status, bare ground may range from 30-40 percent. **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:** Wind scoured, blowouts and/or depositional areas usually do not occur. Some wind erosion may occur immediately following a wildfire on soils that have fine textured surface soils.

---

7. **Amount of litter movement (describe size and distance expected to travel):** Fine litter in the interspaces may move less than 2 feet following a significant run-off event. 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 3 to 5 but need to be tested.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** The A or A1 horizon is typically 0 to 5 inches thick. Structure ranges from weak very fine and fine granular to weak very fine and fine subangular blocky. Soil organic matter (SOM) ranges from 1 to 2 percent.

---

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Bunchgrasses, especially deep-rooted, slow run-off and increase infiltration. Shrubs accumulate snow in the interspaces.

---

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** Compaction layer may be present in areas where livestock trailing occurs. It will be most prevalent if grazing occurs when the soils are wet.

---

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:

---

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Wyoming big sagebrush will become decadent in the absence of fire and ungulate grazing. Grass and forb mortality will occur as medium shrubs increase.

---

14. **Average percent litter cover (%) and depth (in):** Annual litter cover in the interspaces will be 20-30 percent to a depth of <0.1. Under the mature shrubs, litter is greater than 0.5

inches.

---

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Annual production is 350 lbs. per acre in a year with normal precipitation and temperatures. Perennial grasses produce 50-60 percent of the total, forbs 5-15 percent and shrubs 30-40 percent.

---

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 are cheatgrass, medusahead, halogeton, rush skeletonweed, scotch thistle, spotted and diffuse knapweed.

---

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