

## Ecological site R010XA026ID Loamy 11-13 PZ ARTRW8/PSSPS

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### General information

**Provisional.** A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

### MLRA notes

Major Land Resource Area (MLRA): 010X–Central Rocky and Blue Mountain Foothills

This MLRA is characterized by gently rolling to steep hills, plateaus, and low mountains at the foothills of the Blue Mountains in Oregon and the Central Rocky Mountains in Idaho. The geology of this area is highly varied and ranges from Holocene volcanics to Cretaceous sedimentary rocks. Mollisols are the dominant soil order and the soil climate is typified by mesic or frigid soil temperature regimes, and xeric or aridic soil moisture regimes. Elevation ranges from 1,300 to 6,600 feet (395 to 2,010 meters), increasing from west to east. The climate is characterized by dry summers and snow dominated winters with precipitation averaging 8 to 16 inches (205 to 405 millimeters) and increasing from west to east. These factors support plant communities with shrub-grass associations with considerable acreage of sagebrush grassland. Big sagebrush, bluebunch wheatgrass, and Idaho fescue are the dominant species. Stiff sagebrush, low sagebrush, and Sandberg bluegrass are often dominant on sites with shallow restrictive layers. Western juniper is one of the few common tree species and since European settlement has greatly expanded its extent in Oregon. Nearly half of the MLRA is federally owned and managed by the Bureau of Land Management. Most of the area is used for livestock grazing with areas accessible by irrigation often used for irrigated agriculture.

For further information, see "Land Resource Regions and Major Land Resource Areas of the United States, the Caribbean, and the Pacific Basin (U.S. Department of Agriculture Handbook 296, 2006)" available online at: [https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/?cid=nrcs142p2\\_053624](https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/?cid=nrcs142p2_053624)

### Classification relationships

*Artemisia wyomingensis* / *Agropyron spicatum* ht. 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 occurs on uplands
- Slope 5-25%, occurring on all aspects
- Soils are moderately deep.
- Site not associated with recent lava flows
- Soils are not sandy; textures are loams and silt loams.
- Elevation 4000-5500 ft.

### Associated sites

|             |   |
|-------------|---|
| R010XA033ID | <b>Loamy 11-13 PZ ARTRX/PSSPS</b><br>Adjacent low slope areas |
|-------------|---|

|             |  |
|-------------|--|
| R010XA036ID | <b>North Slope Stony 12-16 PZ ARTRX/PSSPS</b><br>Adjacent north slopes   |
| R010XA009ID | <b>South Slope Gravelly 12-16 PZ</b><br>Adjacent south slopes with significant course fragments                              |
| R010XA021ID | <b>South Slope Fractured 12-16 PZ</b><br>Adjacent south slopes with soils less than 20" over fractured bedrock               |
| R010XA025ID | <b>South Slope Loamy 11-13 PZ ARTRW8/PSSPS</b><br>Adjacent south slopes with deep soils                                      |
| R010XA030ID | <b>South Slope Channery 11-13 PZ ARTRX/PSSPS</b><br>Adjacent south slopes in association with rock outcrops and talus slopes |

### Similar sites

|             |  |
|-------------|--|
| R010XA004ID | <b>Loamy 12-16 PZ ARTRV/FEID-PSSPS</b><br>Site supports ARTRV rather than ARTRW8, no abiotic criteria identified |
| R010XA002ID | <b>Clayey 12-16 PZ ARTR4/PSSPS</b><br>Site supports ARTR4 rather than ARTRW8, no abiotic criteria identified     |
| R010XA003ID | <b>Loamy 12-16 PZ ARTRT/FEID</b><br>Site supports ARTRT rather than ARTRW8, no abiotic criteria identified       |
| R010XA023ID | <b>Loamy 12-16 PZ ARTR4/FEID</b><br>Site supports ARTR4 rather than ARTRW8, no abiotic criteria identified       |
| R010XA033ID | <b>Loamy 11-13 PZ ARTRX/PSSPS</b><br>Site supports ARTRX rather than ARTRW8, no abiotic criteria identified      |

**Table 1. Dominant plant species**

|            |   |
|------------|---|
| Tree       | Not specified                                     |
| Shrub      | (1) <i>Artemisia tridentata ssp. wyomingensis</i> |
| Herbaceous | (1) <i>Pseudoroegneria spicata</i>                |

### Physiographic features

This site occurs on nearly level flats and bench lands to rolling and somewhat broken foothills. Slopes predominantly range from 5 to 25 percent, and occasionally go up to 35 percent. Small lava rock outcrop areas may be scattered throughout the site. Elevation ranges from 4000 to 5500 feet (1200 to 1680 meters).

**Table 2. Representative physiographic features**

|                    |  |
|--------------------|--|
| Landforms          | (1) Foothills > Lava plain<br>(2) Foothills > Hill |
| Flooding frequency | None   |
| Ponding frequency  | None   |
| Elevation          | 1,219–1,524 m                                      |
| Slope              | 5–25%  |
| Water table depth  | 203 cm   |
| Aspect             | Aspect is not a significant factor                 |

### Climatic features

The Big and Little Wood River Foot slopes and Plains, proposed as MLRA 10X, has a mean elevation of 5310 feet above sea level, and varies from 3600 to 9235 feet. In general, average annual precipitation is greatest on the western side, with the southeast area being the driest. The average annual precipitation, based on 7 long term climate stations located throughout the MLRA, is 15.39 inches, with a range of 12.5 to 18 inches. Monthly

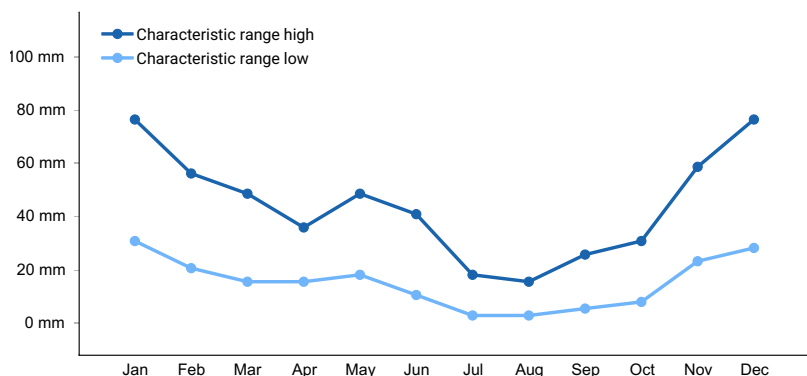
precipitation is generally greatest at the end of the year, diminishes steadily until a low in July and August, then increases rapidly in the autumn.

Monthly temperatures can vary considerably. Highs of up to 102° and lows down to -52° Fahrenheit have been recorded. The average annual temperature is 42.9°. The frost-free period ranges from 75 to 98 days. The freeze-free period is a bit longer: 106 to 133 days.

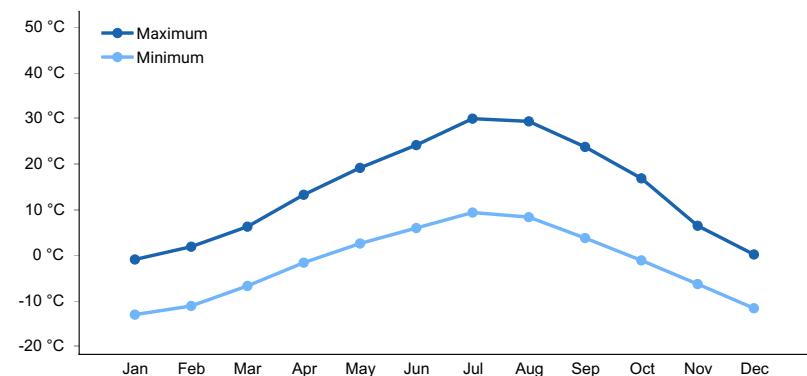
Both morning and afternoon average relative humidity values peak in the winter, and reach their low in July and August. The average number of sunny, cloud-free days is above average for the summer months, but below average for the period from November through February.

**Table 3. Representative climatic features**

|  |              |
|--|--------------|
| Frost-free period (characteristic range)   | 75-98 days   |
| Freeze-free period (characteristic range)  | 106-133 days |
| Precipitation total (characteristic range) | 279-330 mm   |
| Frost-free period (actual range)           |              |
| Freeze-free period (actual range)          |              |
| Precipitation total (actual range)         | 279-457 mm   |
| Frost-free period (average)                | 86 days      |
| Freeze-free period (average)               | 120 days     |
| Precipitation total (average)              | 406 mm       |



**Figure 1. Monthly precipitation range**



**Figure 2. Monthly average minimum and maximum temperature**

## Influencing water features

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

## Wetland description

This site is not influenced by adjacent wetlands.

## Soil features

The soils on this site are silt loams over 20 inches deep to a duripan. The soils are well drained to either bedrock or a duripan. Permeability is impermeable to moderate with available water capacity low to moderate. The moisture supplying capacity of the soils is limited by the depth to the duripan. Water erosion can be high when the plant cover is reduced. These soils are characterized by an aridic soil moisture regime or aridic that borders on xeric. The soil temperature regime is mesic or frigid.

**Table 4. Representative soil features**

|  |  |
|--|--|
| Parent material                                  | (1) Loess<br>(2) Colluvium–volcanic rock<br>(3) Residuum–volcanic rock |
| Surface texture                                  | (1) Cobbly silt loam<br>(2) Silt loam                                  |
| Family particle size                             | (1) Loamy  |
| Drainage class                                   | Well drained   |
| Permeability class                               | Very slow to moderate  |
| Soil depth                                       | 51–152 cm  |
| Surface fragment cover ≤3"                       | 0–5%   |
| Surface fragment cover >3"                       | 0–21%  |
| Available water capacity<br>(0-101.6cm)          | 11.94–21.08 cm   |
| Calcium carbonate equivalent<br>(0-101.6cm)      | 0%   |
| Electrical conductivity<br>(0-101.6cm)           | 0 mmhos/cm   |
| Sodium adsorption ratio<br>(0-101.6cm)           | 0  |
| Soil reaction (1:1 water)<br>(0-101.6cm)         | 6.1–7.8  |
| Subsurface fragment volume ≤3"<br>(10.2-152.4cm) | 2–11%  |
| Subsurface fragment volume >3"<br>(10.2-152.4cm) | 2–11%  |

## Ecological dynamics

The dominant visual aspect of this site is bluebunch wheatgrass and Wyoming big sagebrush. Sandberg bluegrass and bottlebrush squirreltail are subdominant in the stand along with a variety of forbs and small amounts of other shrubs. Composition by weight is approximately 60 to 65 percent grass, 15 to 25 percent forbs and 15 to 25 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 pronghorn antelope, mule deer and lagomorphs.

Fire has historically occurred on the site at intervals of 50 to 70 years.

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

FUNCTION:

This site is suited for livestock in spring, summer and fall. It is used by big game in spring, summer, fall and winter. If water is available, the site is easily grazed by livestock due to gentle slopes.

This site has limited value for recreation.

Due to the low rainfall, low available water holding capacity (AWC) and relatively flat slopes, this site is easily degraded by improper grazing management or frequent fires.

Infiltration can be good with a mixed stand of shrubs and perennial grasses. Snow is caught in the shrub interspaces and a mixed stand of shrubs and perennial grasses is necessary to reach the potential of the site.

Impacts on the Plant Community:

Influence of fire:

In the absence of normal fire frequency, shrubs can gradually increase. Grasses and forbs decrease as shrubs increase.

When fires become more frequent than historic levels (50 to 70 years), Wyoming big sagebrush is reduced significantly. With continued short fire frequency, Wyoming big sagebrush can be completely eliminated along with many of the desirable understory species such as bluebunch wheatgrass, bottlebrush squirreltail, Thurber's needlegrass and indian ricegrass. These species may be replaced by cheatgrass along with a variety of annual and perennial forbs including invasive plants. Sandberg bluegrass usually is maintained in the community.

Three-tip sagebrush is a component of the plant community. Three-tip sagebrush has been found to be a weak sprouter in some locations and a strong sprouter in others. This suggests the species has ecotypic variation from one geographic location to another. Fire in one location may result in killing most of the plants while in another location the plant community may become dominated by three-tip sagebrush following a fire event. Three-tip Sagebrush in this site description is considered to be a weak sprouter, but more data is needed. The time period without fire for Wyoming big sagebrush to establish in this community may be more than 75 years.

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 an increase in Wyoming big sagebrush and noxious and invasive plants.

Continued improper grazing management influences fire frequency by increasing fine fuels. If cheatgrass and/or medusahead increase due to improper grazing management and they become co-dominant with Sandberg bluegrass and other annuals, fires become more frequent. If improper grazing management leads to an increase in fire frequency for the reasons stated above and if three-tip sagebrush is present in the plant community, it may increase.

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

Weather influences:

Above normal precipitation in April, May and June can dramatically increase total annual production of the plant community. These weather patterns can also increase viable seed production of desirable species to provide for recruitment. Likewise, below normal precipitation during these spring months can significantly reduce total annual production and be detrimental to viable seed production. Overall plant composition is normally not affected when perennials have good vigor.

Below normal temperatures in the spring can have an adverse impact on total production regardless of the precipitation. An early, hard freeze can occasionally kill some plants.

Prolonged drought adversely affects this plant community in several ways. Vigor, recruitment, and production are usually reduced. Mortality can occur. Prolonged drought can lead to changes in fire frequency.

Influence of Insects and disease:

Outbreaks can affect vegetation health. An outbreak of a particular insect is usually influenced by weather. Two or more consecutive years may cause mortality of some species. The sagebrush defoliator moth (*Aroga websterii*) causes mortality in relatively small patches. It seldom kills the entire stand. 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:

Many of these species add to the fine-fuel component and lead to increased fire frequency. 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 use this site in the spring, summer, fall and winter. Their numbers are seldom high enough to adversely affect the plant community. If the site is in a wintering area for big game, high numbers can adversely affect the plant community in the early spring.

Watershed:

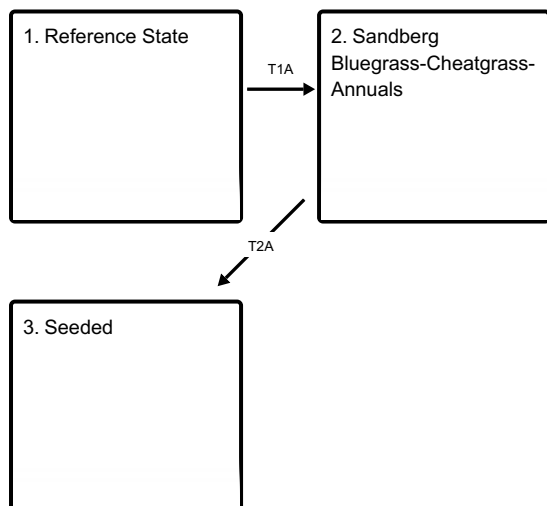
Decreased infiltration and increased runoff on slopes greater than 10 percent occur when Wyoming big sagebrush is removed with frequent fires, particularly the year following the fire event. The increased runoff also causes sheet and rill erosion. The long-term effect is a transition to a different state.

Practice Limitations:

No physical limitations exist for seeding and/or brush management on this site. Planning should carefully analyze the stand of perennial grasses and forbs, because removal of Wyoming big sagebrush can result in a significant increase in cheatgrass. If the plant community becomes dominated with cheatgrass, increased fire frequency could irreversibly degrade the community.

## State and transition model

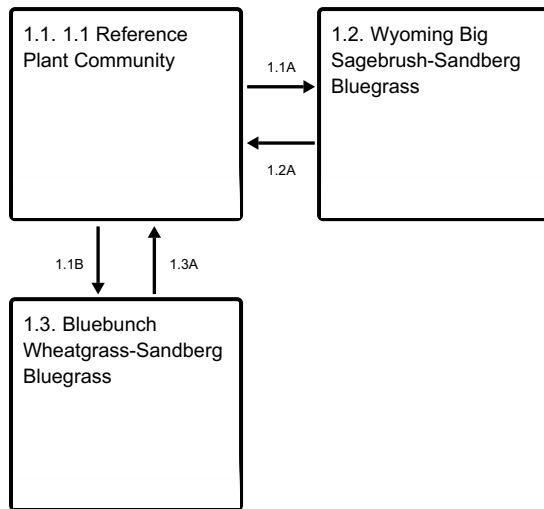
### Ecosystem states



**T1A** - fire, improper grazing management

**T2A** - range seeding

### State 1 submodel, plant communities



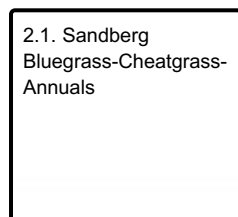
**1.1A** - improper grazing management, absence of fire

**1.1B** - fire

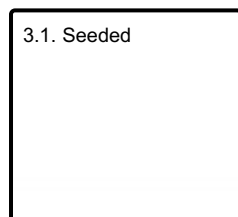
**1.2A** - prescribed grazing and no fire

**1.3A** - prescribed grazing and no fire

### State 2 submodel, plant communities



### State 3 submodel, plant communities



## State 1 Reference State

### Dominant plant species

- Wyoming big sagebrush (*Artemisia tridentata ssp. wyomingensis*), shrub
- bluebunch wheatgrass (*Pseudoroegneria spicata ssp. spicata*), grass

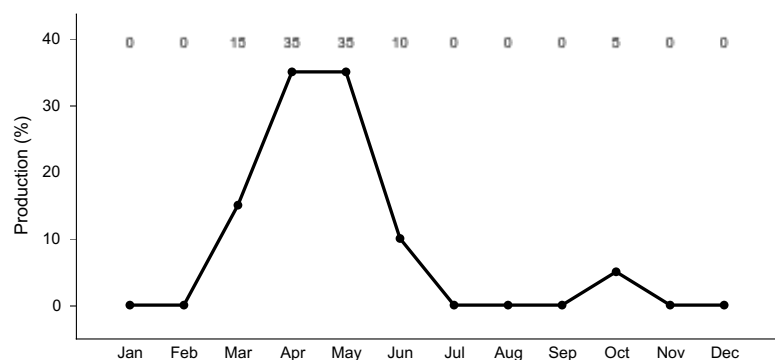
## Community 1.1 1.1 Reference Plant Community

The reference plant community has mountain big sagebrush with Idaho fescue and bluebunch wheatgrass dominating the understory. Thurber's needlegrass, arrowleaf balsamroot and lupine are sub-dominant in the understory. Tall green rabbitbrush and antelope bitterbrush occur in the overstory in small amounts. Natural fire frequency is 20 to 50 years.

**Resilience management.** The Reference Plant Community is community 1.1. This plant community is dominated by Wyoming big sagebrush and bluebunch wheatgrass. Subdominant species include Sandberg bluegrass, bottlebrush squirreltail, Nevada bluegrass, needle and thread, tapertip hawksbeard, lupine and arrowleaf balsamroot. The plant species composition of Community 1.1 is listed later under “Reference Plant Community Plant Species Composition”. Total annual production is 800 pounds per acre (896 kilograms per hectare) in a normal year. Production in a favorable year is 1150 pounds per acre (1288 kilograms per hectare). Production in an unfavorable year is 500 pounds per acre (560 kilograms per hectare). Structurally, cool season deep-rooted perennial bunchgrasses are dominant, followed by shrubs that are about equal to perennial forbs followed by shallow rooted bunchgrasses.

**Table 5. Annual production by plant type**

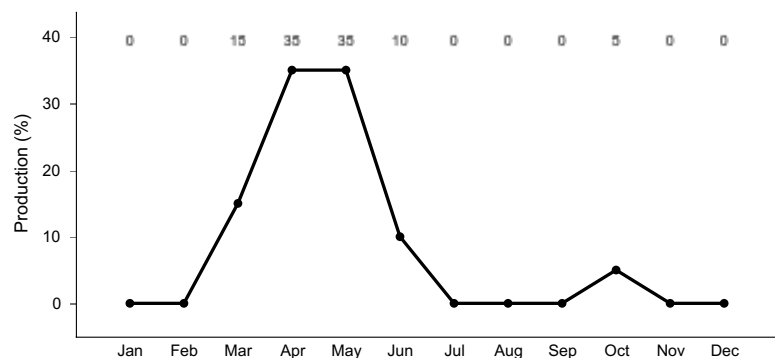
| Plant Type      | Low (Kg/Hectare) | Representative Value (Kg/Hectare) | High (Kg/Hectare) |
|-----------------|------------------|-----------------------------------|-------------------|
| Grass/Grasslike | 336              | 560                               | 785               |
| Shrub/Vine      | 112              | 168                               | 252               |
| Forb            | 112              | 168                               | 252               |
| <b>Total</b>    | <b>560</b>       | <b>896</b>                        | <b>1289</b>       |



**Figure 4. Plant community growth curve (percent production by month). ID0907, ARTRW8/PSSPS LOW PRECIP..**

## Community 1.2 Wyoming Big Sagebrush-Sandberg Bluegrass

This plant community is dominated by Wyoming big sagebrush with Sandberg bluegrass in the understory. This state has developed due to improper grazing management and lack of fire. There is a reduced amount of bluebunch wheatgrass, Nevada bluegrass and bottlebrush squirreltail. These deep-rooted perennial bunchgrasses are typically in low vigor. Tall shrubs have increased.



**Figure 5. Plant community growth curve (percent production by month). ID0907, ARTRW8/PSSPS LOW PRECIP..**

## Community 1.3 Bluebunch Wheatgrass-Sandberg Bluegrass



This plant community is dominated by bluebunch wheatgrass, Sandberg bluegrass and bottlebrush squirreltail. Forbs remain about in the same proportion as Plant Community 1.1. Small amounts of Wyoming big sagebrush are present due to wildfire, but some green rabbitbrush, three-tip sagebrush and gray horsebrush are present due to sprouting and may have increased. This plant community is the result of wildfire.

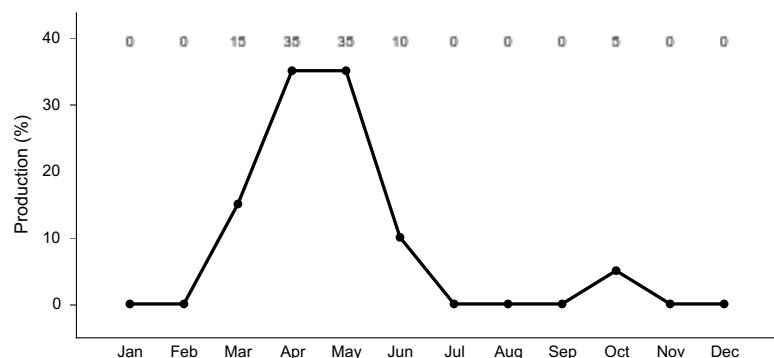


Figure 6. Plant community growth curve (percent production by month). ID0907, ARTRW8/PSSPS LOW PRECIP..

### Pathway 1.1A Community 1.1 to 1.2

1.1A - Develops with improper grazing management and in the absence of fire.

### Pathway 1.1B Community 1.1 to 1.3

1.1B - Develops with fire.

### Pathway 1.2A Community 1.2 to 1.1

1.2A - Develops with prescribed grazing and no fire.

### Pathway 1.3A Community 1.3 to 1.1

1.3A - Develops with prescribed grazing and no fire.

## State 2 Sandberg Bluegrass-Cheatgrass-Annuals

**Resilience management.** Excessive soil loss and changes in the hydrologic cycle caused by continued 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 economically impractical to return this state to State 1 with accelerated practices.

### Dominant plant species

- Sandberg bluegrass (*Poa secunda*), grass
- cheatgrass (*Bromus tectorum*), grass

## Community 2.1 Sandberg Bluegrass-Cheatgrass-Annuals

This plant community is dominated by Sandberg bluegrass, cheatgrass, bulbous bluegrass and annuals. Root sprouting shrubs such as green rabbitbrush and gray horsebrush can be present, dependent upon, how frequent, fire has occurred. This state has developed due to frequent fires and improper grazing management from community 1.3 and fire and improper grazing management from community 1.2. Some soil loss has occurred. This

site has crossed the threshold. It is economically impractical to return this state to State 1 with accelerated practices.

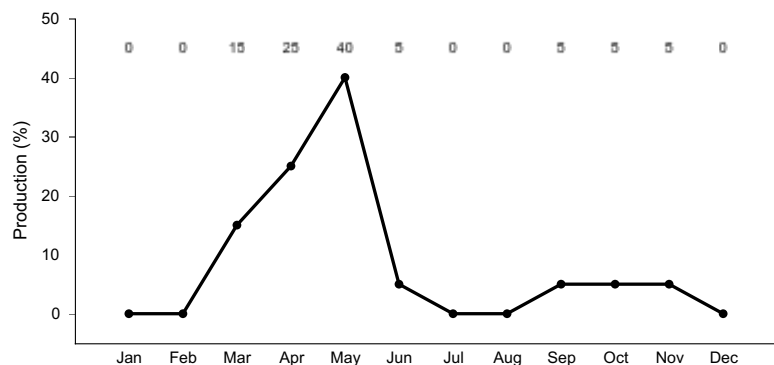


Figure 7. Plant community growth curve (percent production by month). ID0911, D25 POSE/BRTE/ANNUALS.

### State 3 Seeded

#### Dominant plant species

- crested wheatgrass (*Agropyron cristatum*), grass

### Community 3.1 Seeded

This plant community is dominated by the seeded species. The seeding can be introduced species or native species that simulate State 1. This community is the result of range seeding.

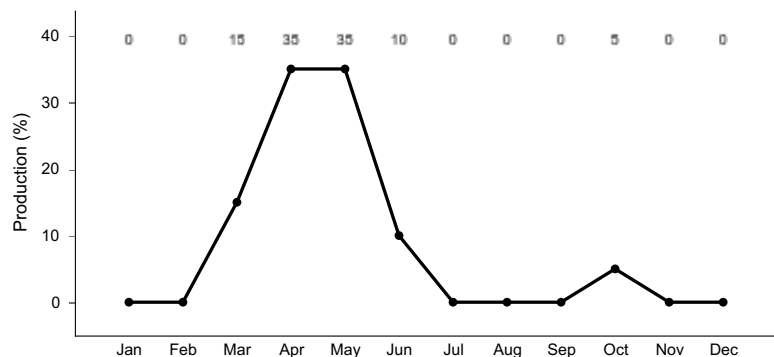


Figure 8. Plant community growth curve (percent production by month). ID0907, ARTRW8/PSSPS LOW PRECIP..

### Transition T1A State 1 to 2

T1A - Develops through fire and improper grazing management. This site has crossed the threshold. T1B - Develops through frequent fire and with improper grazing management. This site has crossed the threshold. It is economically impractical to return this state to State 1 with accelerated practices.

### Transition T2A State 2 to 3

T2A - Develops through range seeding.

### Additional community tables

Table 6. Community 1.1 plant community composition

| Group                  | Common Name           | Symbol | Scientific Name                                      | Annual Production (Kg/Hectare) | Foliar Cover (%) |
|------------------------|-----------------------|--------|--|--------------------------------|------------------|
| <b>Grass/Grasslike</b> |                       |        |  |                                |                  |
| 1                      |                       |        |  | 179–420                        |                  |
|                        | bluebunch wheatgrass  | PSSP6  | <i>Pseudoroegneria spicata</i>                       | 179–420                        | –                |
| 2                      |                       |        |  | 129–381                        |                  |
|                        | Sandberg bluegrass    | POSE   | <i>Poa secunda</i>                                   | 22–56                          | –                |
|                        | wood bluegrass        | PONE   | <i>Poa nemoralis</i>                                 | 22–56                          | –                |
|                        | needle and thread     | HECO26 | <i>Hesperostipa comata</i>                           | 17–45                          | –                |
|                        | squirreltail          | ELEL5  | <i>Elymus elymoides</i>                              | 17–39                          | –                |
|                        | thickspike wheatgrass | ELLA3  | <i>Elymus lanceolatus</i>                            | 11–28                          | –                |
|                        | prairie Junegrass     | KOMA   | <i>Koeleria macrantha</i>                            | 11–28                          | –                |
|                        | basin wildrye         | LECI4  | <i>Leymus cinereus</i>                               | 11–28                          | –                |
|                        | western wheatgrass    | PASM   | <i>Pascopyrum smithii</i>                            | 11–28                          | –                |
|                        | sedge                 | CAREX  | <i>Carex</i>   | 0–22                           | –                |
|                        | Idaho fescue          | FEID   | <i>Festuca idahoensis</i>                            | 0–22                           | –                |
|                        | Thurber's needlegrass | ACTH7  | <i>Achnatherum thurberianum</i>                      | 0–11                           | –                |
| <b>Forb</b>            |                       |        |  |                                |                  |
| 3                      |                       |        |  | 39–213                         |                  |
|                        | tapertip hawksbeard   | CRAC2  | <i>Crepis acuminata</i>                              | 17–45                          | –                |
|                        | arrowleaf balsamroot  | BASA3  | <i>Balsamorhiza sagittata</i>                        | 0–34                           | –                |
|                        | lupine                | LUPIN  | <i>Lupinus</i>                                       | 11–34                          | –                |
|                        | spiny phlox           | PHHO   | <i>Phlox hoodii</i>                                  | 6–22                           | –                |
|                        | longleaf phlox        | PHLO2  | <i>Phlox longifolia</i>                              | 6–22                           | –                |
|                        | woolly locoweed       | ASMO7  | <i>Astragalus mollissimus</i>                        | 0–22                           | –                |
|                        | aster                 | ASTER  | <i>Aster</i>   | 0–22                           | –                |
|                        | Hooker's balsamroot   | BAHO   | <i>Balsamorhiza hookeri</i>                          | 0–22                           | –                |
|                        | tapertip onion        | ALAC4  | <i>Allium acuminatum</i>                             | 0–6                            | –                |
|                        | pussytoes             | ANTEN  | <i>Antennaria</i>                                    | 0–6                            | –                |
|                        | foothill deathcamas   | ZIPA2  | <i>Zigadenus paniculatus</i>                         | 0–6                            | –                |
|                        | little larkspur       | DEBI   | <i>Delphinium bicolor</i>                            | 0–6                            | –                |
|                        | beardtongue           | PENST  | <i>Penstemon</i>                                     | 0–6                            | –                |
|                        | desertparsley         | LOMAT  | <i>Lomatium</i>                                      | 0–6                            | –                |
| <b>Shrub/Vine</b>      |                       |        |  |                                |                  |
| 4                      |                       |        |  | 118–319                        |                  |
|                        | Wyoming big sagebrush | ARTRW8 | <i>Artemisia tridentata</i> ssp. <i>wyomingensis</i> | 84–196                         | –                |
|                        | threetip sagebrush    | ARTR4  | <i>Artemisia tripartita</i>                          | 34–84                          | –                |
|                        | yellow rabbitbrush    | CHVI8  | <i>Chrysothamnus viscidiflorus</i>                   | 0–22                           | –                |
|                        | granite prickly phlox | LIPU11 | <i>Linanthus pungens</i>                             | 0–6                            | –                |
|                        | plains pricklypear    | OPPO   | <i>Opuntia polyacantha</i>                           | 0–6                            | –                |
|                        | antelope bitterbrush  | PUTR2  | <i>Purshia tridentata</i>                            | 0–6                            | –                |

## 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. 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 and pygmy rabbits. Encroachment of noxious and invasive plant species (cheatgrass, Rush skeleton weed, and knapweed) can replace native plant species which provide critical feed, brood-rearing and nesting cover for a variety of native wildlife. The loss of herbaceous (grass and forbs) understory vegetation can have a negative impact on ground nesting birds, while the loss of shrub cover negatively affects both ground and shrub nesting avians. Water is limited, being provided only by seasonal runoff, artificial water catchments and spring sites. This rangeland ecological site is commonly associated with pre-historic lava flows which provide unique cave habitats for several sensitive animal species, including the blind cave leiodid beetle, cave obligate mite, bats and cave obligate harvestman.

State 1 Phase 1.1 - Wyoming Big Sagebrush/ Bluebunch Wheatgrass/ Sandberg Bluegrass/ Nevada Bluegrass 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, western toad, boreal chorus frog and northern leopard frog. Amphibians are associated with springs and isolated water bodies adjacent to this plant community. Shrub-steppe obligate avian species include the Brewer's sparrow, sage sparrow, sage thrasher and sage-grouse. Critical habitat (lek sites, nesting areas, winter cover and food) for sage-grouse is provided by this diverse plant community. The plant community supports the needs of large mammals (mule deer, antelope, and elk) providing food and cover on a seasonal basis. Wyoming big sagebrush is preferred browse for ungulates. A diverse small mammal population including golden-mantled ground squirrels, chipmunks and yellow-bellied marmots utilize this community.

State 1 Phase 1.2 - Wyoming Big Sagebrush/ Sandberg Bluegrass Plant Community: This plant community is the result of improper grazing management. 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 less diversity and numbers of insects. The reptile and amphibian community is represented by leopard lizard, short horned lizard, sagebrush lizard, western skink, western rattlesnake, western toad, boreal chorus frog, and northern leopard frog. Diversity and populations of reptiles and amphibians may be reduced due to reduced prey species and cover. Reduced herbaceous understory is a key factor in limiting the use of this plant community by avian species. Key shrub-steppe avian obligates include Brewer's sparrow, sage sparrow, sage thrasher and sage-grouse. Critical habitat (lek sites, nesting areas, winter cover and food) for sage-grouse is limited due to a less diverse herbaceous plant community. The plant community supports seasonal needs of large mammals (mule deer, antelope, and elk) providing food and cover. Wyoming big sagebrush is preferred browse for these wild ungulates. A diverse small mammal population including golden-mantled ground squirrels, chipmunks and yellow-bellied marmots utilize this plant community.

State 1 Phase 1.3 - Bluebunch Wheatgrass/ Sandberg Bluegrass/ Bottlebrush Squirreltail Plant Community: This plant community is the result of fire. The plant community, dominated by herbaceous vegetation with little or no sagebrush provides less vertical structure and limits use by shrub obligate animals. Insect diversity would be reduced but a diverse native forb plant community would still support select pollinators. Cave dwelling insects and mammals from adjacent habitats would be supported by this plant community. 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 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. Winter habitat and nesting cover for sage-grouse has been eliminated. The dominant herbaceous vegetation improves habitat for grassland avian species (horned lark and western meadowlark). Large mammal (mule deer, antelope, and elk) foraging would be seasonal but this community would offer little thermal cover and young of year cover. Small mammal diversity would be reduced and the reduced sagebrush density would not provide suitable habitat for pygmy rabbits.

State 2 - Sandberg Bluegrass/ Cheatgrass/ Bulbous Bluegrass and Annual Plant Community: This plant community is the result of continued improper grazing management and/or frequent fire. The loss of the native shrub and herbaceous plant community would not support a diverse insect community. The reduced forb component in the plant community would support a very limited population of pollinators. 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 grassland avian 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. The reduction of insect populations and diversity would reduce suitability of the site for bats. The diversity and populations of small mammals would be dominated by open grassland species like the Columbian ground squirrel.

State 3 - Range Seeding Plant Community: The seeding mixture (native or non-native) determines the animal species that would 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 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.

#### Grazing Interpretations.

This site is suited for livestock in spring, summer and fall. If water is available, the site is easily grazed by livestock due to gentle slopes.

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.

### Hydrological functions

The hydrologic condition of rangelands is the result of complex interrelationships of soil, vegetation, topography and climate. The hydrology of this site is characterized by low intensity frontal storms from October through April, and occasional high intensity thunderstorms during summer. Approximately 50 percent comes during the plant growing season, with May and June as the wettest months. About 25 to 35 percent of the precipitation falls as snow, and snow depth especially at lower elevations is not sufficient to insulate the soils from freezing. Soil frost influences runoff and infiltration, and freezing and thawing cycles can maintain a saturated soil condition which leads to breakdown of soil aggregates. Wyoming big sagebrush sites at elevations ranging from 4,000 to 5,500 feet on these loamy sites typically generate little runoff. Macropore flow is an important process on this site, where water flows in interspace "channels" or low areas, and is intercepted by shrub coppices with higher infiltration rates. Runoff averages about 3 percent of the annual water budget. Ponding and flooding generally do not occur on this site. Run-on from adjacent sites normally does not occur.

#### 1.1 Reference Plant Community

In this community, especially on less steep slopes, the majority of rainfall and snowmelt infiltrates into the soil profile and the erosion potential is very low. Shrub canopy zones (coppices) generally have higher rates of infiltration than shrub interspaces because of differences in soil morphology, organic matter and surface litter cover. Moss and lichens dominate most coppices as ground cover. Interspaces between shrubs are either bare or partially covered with rock or litter. Moss in the sagebrush understory is a good indicator of proper hydrologic function. Dominance of bluebunch wheatgrass in the understory is also an indicator of good hydrologic condition. When soil surface condition is dry, and undecomposed litter biomass accumulates, water repellency can develop on lighter textured soils. Little runoff occurs from this site, especially at lower slopes. When runoff does occur, it is typically in late spring and is associated with snowmelt or rainfall on frozen soils. Occasional large thunderstorms will generate runoff in summer. Very little sediment is delivered off-site. When sediment loss does occur, it is usually in late winter when soil aggregate stability is lowest, or in summer when dry conditions increase repellency. Deep percolation (less than one percent of water budget) does not generally occur on this site, due to low precipitation and the

presence of duripans.

### Plant Community 1.2

Increasing sagebrush density and cover, due to the lack of fire or improper grazing management, is associated with deteriorating hydrologic condition. Increasing water repellency and subsequently higher runoff rates are associated with litter buildup in decadent Wyoming big sagebrush coppice microsites. Repellency typically increases during dry conditions, so that runoff and erosion are more likely to occur from smaller and/or less intense storm events. Studies show increasing cover of sagebrush is typically correlated with greater sediment/runoff ratios. The loss of vigorous deep-rooted bunchgrasses in conjunction with invading annual grasses is indicative of reduced infiltration capacity. Dominance of Sandberg bluegrass in the understory is also correlated with higher runoff rates. The presence of increased shrub cover, including taller shrubs, increases the chance of interception loss. Chemical brush management should have minimal impact on sagebrush hydrology if other factors remain undisturbed (coppice characteristics remain intact, with little impact on litter cover), and will invigorate native bunchgrasses if managed properly. Prescribed burns are best used to create mosaics on these Wyoming big sage brush sites, where it may take 20 to 40 years for recovery following fire, regardless of intensity. Disturbance increases the risk of invasion by annuals.

### Plant Community 1.3

Fire can reduce infiltration and increase runoff and erosion causing reduced site productivity and contributing to water quality impacts. Fire reduces random roughness and significantly reduces plant cover, litter biomass, and organic matter in the soil surface. Burning also reduces macrofauna populations that contribute to increased aggregate stability through secreted compounds and fungal hyphae production. Where litter cover remains intact, fire impacts are reduced. The effects of fire on the risk of runoff and erosion will be significant on steeper sites until ground and canopy cover recover. Amount of runoff and erosion will depend on the weather pattern during the recovery period. Under severe burn conditions, the probability of erosion exceeding 2.5 tons/acre the year following the burn is approximately 20% given typical weather patterns and burn conditions. After fire, water repellency often occurs on the soil surface, with burned coppices being most impacted. Mosaic burn patterns on a pre-fire HCPC site will somewhat mitigate erosion and runoff effects. Repellency is typically gone after two to three seasons following fire, and hydrologic function improves significantly. Good grazing management that addresses frequency, duration, and intensity of grazing can keep fine fuels from developing and promote native bunchgrasses. Recovered sites with bluebunch wheatgrass dominating the understory have good hydrologic function. Gradual increases in Wyoming big sagebrush will tend to reduce fire frequency. These sites typically take 20 to 40 years for sagebrush canopy to regain pre-fire cover levels.

### State 2

Litter cover can be reduced by 50% and bare ground can increase to over 70% immediately following fire. Repeated fires significantly reduce site productivity. Dominance of annual grass and forbs is typical, and is associated with unstable hydrologic conditions. Due to diffuse basal characteristics, annual grasses generally do not have the capacity to catch and hold sediment like bunchgrass clumps. There is no shrub cover and little understory to mitigate the impact of rainfall on soil, which leads to increased soil detachment and availability for transport. While rock cover, when present, may reduce detachment, it reduces infiltration and speeds delivery and transport of sediment. Wyoming big sagebrush sites often have higher erodibility than other sagebrush sites, and have the potential to produce significant amounts of sediment loss during larger storm events. This is correlated with less litter, grass cover, and more bare ground on these frequently burned sites. In heavy stands of cheatgrass and other annual species, runoff potential is reduced during spring and early summer. Fire risk can be high, especially when conditions are dry. More frequent fires result in increased bare ground conditions which are highly susceptible to water and wind erosion. Repeated cycles of annual grass regeneration and repeated fire can result in severe depletion of the surface soil horizon and organic matter. Reductions in organic matter lead to reduced aggregate stability, reducing infiltration and plant available water, and increasing the risks of runoff and soil loss. Reduced cover and reduced random roughness due to repeated burns provide interconnected flow paths for runoff and associated erosion. Sediment yields increase as rill processes become dominant. With improper grazing management, trail areas become compacted, leading to further rill and gully creation.

### State 3

Seeding is not likely to reduce runoff or erosion in the year following a burn. Seeding of native or desired species, if successful, will help stabilize the erosion process and improve hydrologic conditions over time. As sagebrush and

other shrubs establish, hydrologic function of this state will approach Reference if significant soil loss has not occurred prior to seeding. Where shrubs successfully establish or increase naturally into the seeding, the site will be less prone to freeze-thaw processes and some snow will accumulate during winter storms. Seeding and restoration of the site will be dependent on how far the site productivity and hydrologic condition has diminished before management.

## **Recreational uses**

The site has some hiking and horseback opportunities. ATV's use the site due to its gentle slopes.

## **Wood products**

None

## **Other products**

None

## **Other information**

Field Offices:

Mountain Home, ID  
Gooding, ID  
Fairfield, ID  
Shoshone, ID  
Rupert, ID  
Arco, ID

## **Inventory data references**

Information presented here has been derived from NRCS clipping and other inventory data. Also, field knowledge of range-trained personnel was used. Those involved in developing this site description include:

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## Contributors

Dave Franzen  
Jacy Gibbs

## Approval

Kirt Walstad, 12/13/2023

## Rangeland health reference sheet

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

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|--------------------------|--|
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| Approved by              | Kirt Walstad   |



|   |                   |
|---|-------------------|
| Approval date                               |                   |
| Composition (Indicators 10 and 12) based on | Annual Production |

## Indicators

1. **Number and extent of rills:** Rarely occur on this site. If rills are present they are likely to occur on slopes over 10 percent and immediately following wildfire. They are most likely to occur on silt loam surface textures.  

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2. **Presence of water flow patterns:** Rarely occur on this site except on slopes greater than 10 percent. If they occur, they are short and disrupted flows. They are disrupted by cool season grasses and tall shrubs and are not extensive.  

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3. **Number and height of erosional pedestals or terracettes:** Are rare on this site. Where flow patterns and/or rills are present, a few pedestals may be expected.  

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** On sites in mid-seral status bare ground may range from 30-50 percent.  

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5. **Number of gullies and erosion associated with gullies:** None  

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6. **Extent of wind scoured, blowouts and/or depositional areas:** Usually not present. Immediately following wildfire some soil movement may occur on lighter textured soils. Where sagebrush has repopulated the site after a fire, remnants of past wind scour may be present.  

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7. **Amount of litter movement (describe size and distance expected to travel):** Fine litter in the interspaces may move up to 2 feet following a significant run-off event. 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 4 to 6.  

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** The A or A1 horizon is typically 6 to 10 inches thick. Structure ranges from weak thin or thick platy to weak or moderate fine granular. Soil organic matter (SOM) ranges from 1 to 4 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 perennials, slow run-off and increase infiltration. Tall shrubs can catch 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): Not present

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

Dominant: Cool season deep -rooted perennial bunchgrasses >

Sub-dominant: Tall shrubs= perennial forbs >

Other: shallow rooted grasses

Additional:

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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 normal fire frequency. Grass and forb mortality will occur as tall shrubs increase.
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14. **Average percent litter cover (%) and depth ( in):** Litter cover is expected to be 5-20 percent to a depth of 0.1 inches. Under mature shrubs litter is <0.5 inches deep and is 90-100 percent ground cover
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Annual Production is 800 pounds per acre (896 kilograms per hectare) in a year with normal temperatures and precipitation. Perennial grasses produce 60-65 percent of the total production, forbs 15-25 percent and shrubs 15-25 percent.
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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** Cheatgrass, *Vulpia* sp., annual mustards, bulbous bluegrass, and species listed on state noxious weed list.
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17. **Perennial plant reproductive capability:** All functional groups have the potential to reproduce in most years.
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