USDA Natural Resources
Conservation Service

Ecological site R011XB001ID
Loamy 8-12 PZ

Last updated: 3/11/2025
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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): 011X–Snake River Plains

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Precipitation or Climate Zone: 8-12” P.Z.

Classification relationships

Artemisia wyomingensis/ 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”.

Land Resource Region: B (Northwest Wheat and Range)
MLRA: 11 (Snake River Plains)
EPA Eco Region: Level III (Snake River Plain)

Ecological site concept

Site does not receive additional moisture
Soils are:
Not saline or saline sodic
Deep to very deep, with <35% coarse fragments (by volume), not skeletal
not strongly or violently effervescent in the surface mineral 10”
Textures range from fine sandy loam to loam in the 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

R011XA003ID	**Shallow Loam 8-12 PZ ARTRT/PSSPS**
R011XB003ID	**Stony Loam 8-12 PZ ARTRW8/PSSPS**
R011XB006ID	**Loamy 8-12 PZ ARTRT/LECI4**
R011XB009ID	**Shallow Stony 8-12 PZ ARTRW8/PSSPS**
R011XB016ID	**Sand 8-12 PZ ARTRT-PUTR2/HECOC8**
R011XY007ID	**Gravelly 10-12 PZ**
R011XY008ID	**South Slope 10-12 PZ**
R011XY015ID	**Loamy Bottom 8-14 PZ ARTRT/LECI4**

Similar sites

R011XB009ID	**Shallow Stony 8-12 PZ ARTRW8/PSSPS**
R011XB010ID	**Loamy 12-16 PZ ARTRW8/PSSPS**

Table 1. Dominant plant species

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

Physiographic features

This site occurs on nearly level lava plains, terraces, and benchlands, and on rolling and somewhat broken foothills. Slopes range from 1 to 30 percent. Small lava rock outcrop areas may be scattered throughout the site. Elevations range from 4000 to 5500 feet (1200-1680 meters). It occurs on all aspects.

Table 2. Representative physiographic features

Landforms	(1) Lava plain (2) Terrace
Flooding frequency	None
Ponding frequency	None
Elevation	1,219–1,676 m
Slope	1–30%
Aspect	N, W

Climatic features

The Upper Snake River Plain, MLRA 11B, is part of the Northwestern Wheat and range Region. It has a mean elevation of 4841 feet above sea level, and varies from 4177 to 4841 feet. In general, it is a geologically young, level to gently sloping lava plateau. In places larger streams have cut deep, steep-walled canyons. The average annual precipitation, based on 10 long term climate stations located throughout the MLRA, is 10.88 inches. The averaged low is 8.74 inches and the maximum average is 12.69. Monthly precipitation usually peaks in May, then drop off rapidly to reach its low in July and August. The climate station at Aberdeen Experiment Station (1000010) has records of zero precipitation in 11 months of the year, and as low as 0.03 inches in December, the lone non-zero month.

Temperatures can be extremely variable across the year. Highs of up to 104° and lows down to -42° Fahrenheit have been recorded. The average annual temperature from ten climate stations is 44.75° F. The frost-free period ranges from 91 to 115 days. The freeze-free period can last from 123 to 146 days.

Both morning and afternoon average relative humidity values reach their low in August, and are far below the national average. Wind speed peaks in the Spring, and is generally somewhat above the national average. 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. The average total snowfall is approximately 29 inches.

Table 3. Representative climatic features

Frost-free period (average)	115 days
Freeze-free period (average)	146 days
Precipitation total (average)	330 mm

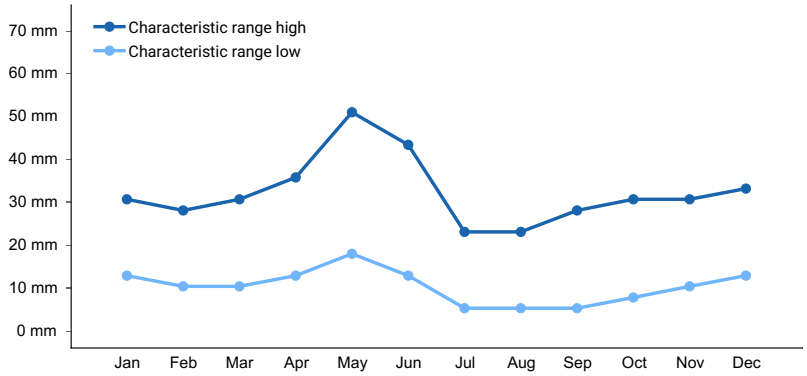


Figure 1. Monthly precipitation range

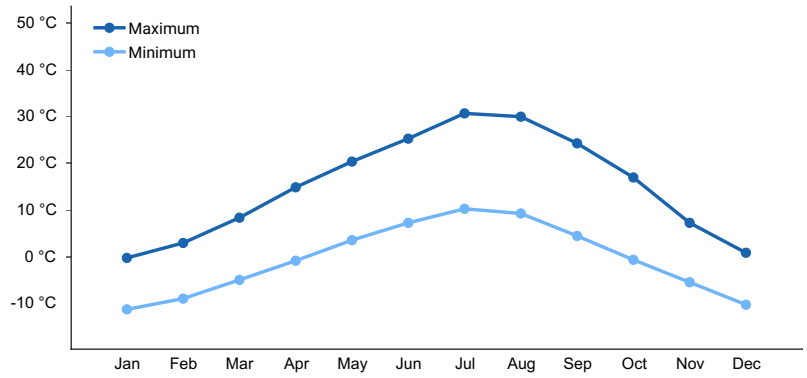


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

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

Soil features

Soils of light colored loams, silt loams, fine sandy loams over 20 inches deep. They may be gravelly or stony but not in sufficient amounts to limit production. Subsoils are medium textured and have a lime accumulation at depths of 7-18 inches. Substratum may be sand, gravel, basalt or hardpan. Organic matter content is low, permeability moderate, and available water holding capacity (AWC) about 2 inches per foot of effective depth. Erosion hazard is moderate, especially when plant cover is scarce or lacking. Lime may be present within 7 inches of the surface. These soils have an aridic moisture regime and a mesic or frigid temperature regime.

Table 4. Representative soil features

Parent material	(1) Eolian deposits–basalt
Surface texture	(1) Stony silt loam (2) Gravelly loam (3) Fine sandy loam
Drainage class	Well drained
Permeability class	Slow to moderately rapid
Soil depth	51–152 cm
Surface fragment cover <=3"	0–15%
Surface fragment cover >3"	0–7%
Available water capacity (0-101.6cm)	5.08–19.05 cm

Calcium carbonate equivalent (0-101.6cm)	0–20%
Electrical conductivity (0-101.6cm)	0–16 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–15
Soil reaction (1:1 water) (0-101.6cm)	6.8–9
Subsurface fragment volume <=3" (Depth not specified)	0–30%
Subsurface fragment volume >3" (Depth not specified)	0–15%

Ecological dynamics

Ecological Dynamics of the Site.

The dominant visual aspect of this site is Wyoming big sagebrush with an understory of bluebunch wheatgrass. Composition by weight is approximately 50 to 65 percent grasses, 10 to 20 percent forbs and 15 to 30 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, pronghorn antelope, lagomorphs and small rodents.

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

The Reference Plant Community 1.1 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 is community 1.1. This plant community is dominated by bluebunch wheatgrass and Thurber’s needlegrass in the understory and Wyoming big sagebrush in the overstory. Subdominant species include Sandberg bluegrass, arrowleaf balsamroot and tapertip hawksbeard. There is a large variety of other grasses, forbs and shrubs that can occur in minor amounts. The plant species composition of Reference Plant Community 1.1 is listed later under Plant Species Composition.

Total annual production is 750 pounds per acre (840 kilograms per hectare) in a normal year. Production in a favorable year is 1200 pounds per acre (1344 kilograms per hectare). Production in an unfavorable year is 400 pounds per acre (448 kilograms per hectare). Structurally, cool season deep rooted perennial bunchgrasses are very dominant, followed by tall shrubs being more dominant than perennial forbs while shallow rooted bunchgrasses are subdominant.

FUNCTION:

This site is suited for livestock grazing in the spring, early summer and fall. There are few limitations to grazing. The distance to water may be a problem in some areas. Usually this site is the key area in a management program.

The site provides winter and spring range for mule deer. It has some value as sage grouse brood rearing.

The site has limited value for recreation but does provide some hunting, hiking, photography opportunities and off-road vehicle use.

Due to gentle slopes and relatively low production, this site can easily be degraded from improper livestock management. 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, 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 most of the primary understory species.

When fires become more frequent than historic levels (50-70 years), Wyoming big sagebrush is reduced significantly. Rabbitbrush and threetip sagebrush can increase slightly. With continued short fire frequency, Wyoming big sagebrush can be completely eliminated along with many of the desirable understory species such as bluebunch wheatgrass, Indian ricegrass and Thurber's needlegrass. These species may be replaced by Sandberg bluegrass along with a variety of annual and perennial forbs including noxious and invasive plants. Cheatgrass will invade the site. These fine fuels will increase the fire frequency.

Threetip sagebrush is a component of the plant community. Threetip 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 dominanted by threetip sagebrush following a fire event. Threetip sagebrush in this site description is considered to be a weak sprouter, but more data is needed.

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. Threetip sagebrush may increase if present in the community.

Continued improper grazing management influences fire frequency by increasing noxious and invasive species that generate fine fuels that readily carry fires. As cheatgrass increases and becomes 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 desirable perennial bunchgrasses can result in an increase in cheatgrass 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 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:

Outbreaks can affect vegetation health. 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.
Perennial and annual invasive species compete with desirable plants for moisture and nutrients. The result is reduced production and change in composition of the understory.

Influence of wildlife:

Big game animals use this site in the spring, summer, and fall and in moderate winters. Their numbers are seldom high enough to adversely affect the plant community.

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.
1.1A Develops with improper grazing management.
1.1B Develops with fire.
1.2A. Develops with prescribed grazing.
1.3A Develops with prescribed grazing and no fire.

T1A Develops through frequent fire or continued improper grazing management. This site has crossed the threshold. It is generally not economically feasible to move this state back to State 1 with accelerated practices.

T2A Is a result of rangeland seeding.

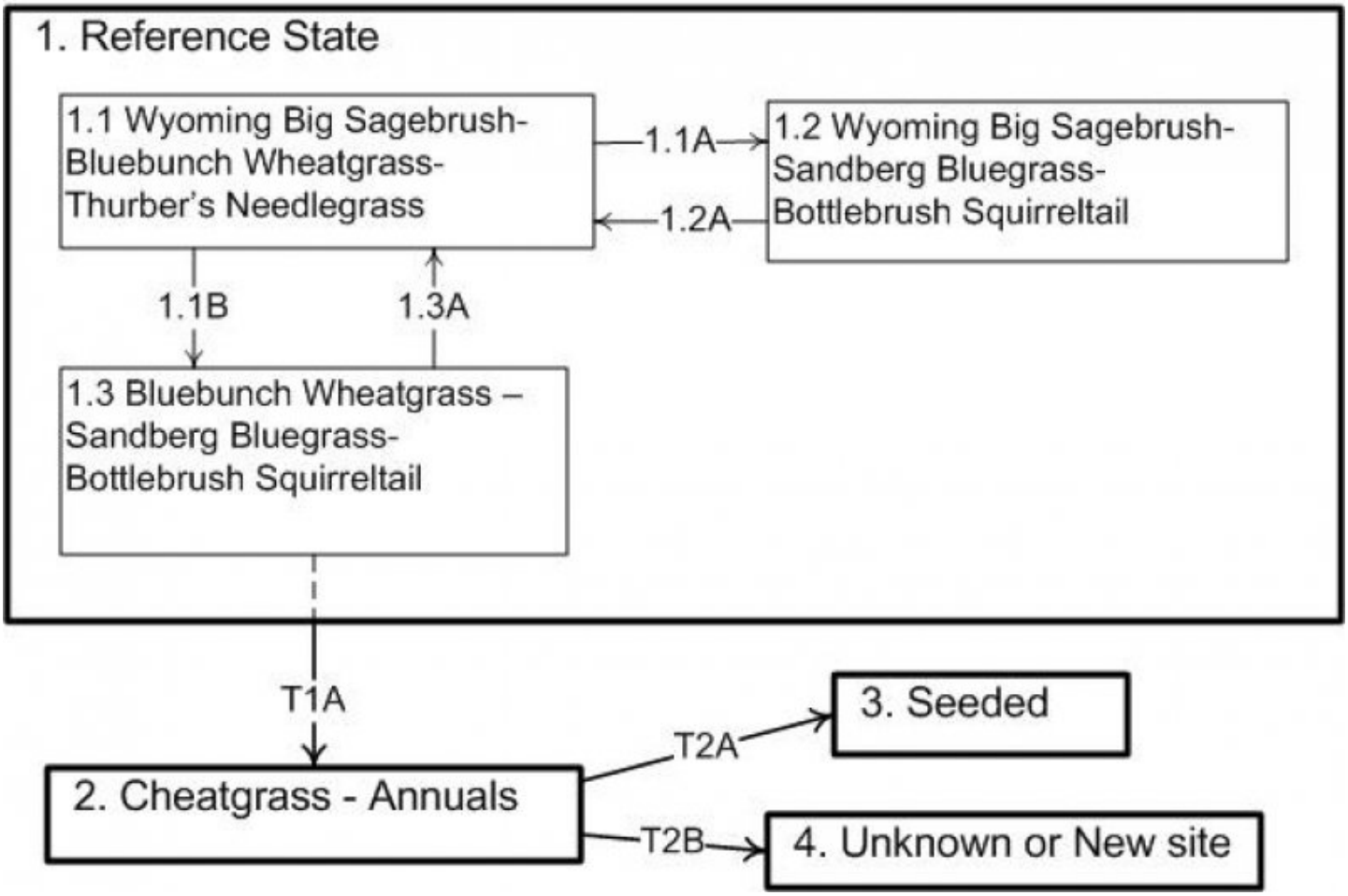
T2B Excessive soil loss and changes in the hydrologic cycle caused by continued improper grazing management and/or frequent fire cause this state to cross a threshold and retrogress to a new site with reduced potential. It is generally not economically feasible to move this state back to State 1 with accelerated practices.

Practice Limitations:

There are no physical limitations to prevent seeding of this site. Good seedbed preparation is critical on this site. There is a moderate to high chance of seeding failure during unfavorable moisture years. There are no physical limitations for brush management on this site, but careful planning is necessary. Removal of Wyoming big sagebrush can result in a significant invasion of cheatgrass.

State and transition model

R011BY001ID – Loamy 8-12 ARTRW8/PSSPS



State 1
Reference

Community 1.1
Wyoming big sagebrush - bluebunch wheatgrass

The Reference Plant Community has Wyoming big sagebrush in the overstory with bluebunch wheatgrass dominating the understory. Thurber's needlegrass is the subdominant grass. Other significant species include Sandberg bluegrass, tapertip hawksbeard and arrowleaf balsamroot. There can be a variety of other grasses, forbs and shrubs in minor amounts. Natural fire frequency is 50-70 years.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	269	504	807
Shrub/Vine	112	202	314
Forb	67	135	224
Total	**448**	**841**	**1345**

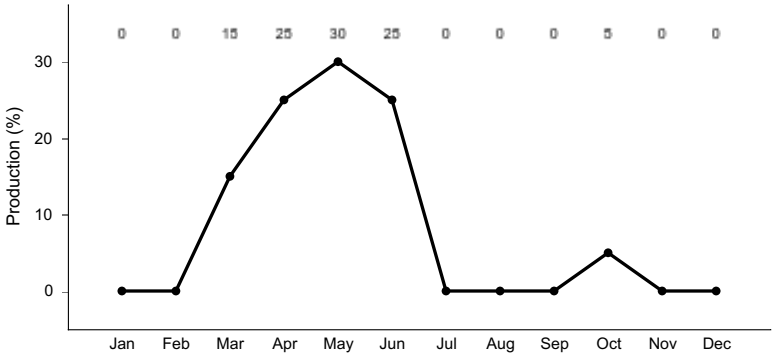


Figure 4. Plant community growth curve (percent production by month). ID0605, ARTRW8 -PSSPS . State 1.

Community 1.2
Wyoming big sagebrush with reduced bunchgrasses

This plant community is dominated by Wyoming big sagebrush with reduced amounts of bluebunch wheatgrass. Sandberg bluegrass and bottlebrush squirreltail has increased in the understory. Thurber's needlegrass gradually decreases. There is a reduced amounts of other perennial grasses. All deep-rooted perennial bunchgrasses are typically in low vigor. Wyoming big sagebrush has increased. Threetip sagebrush may increase if present in the community. This state has developed due to improper grazing management. Some cheatgrass may have invaded the site.

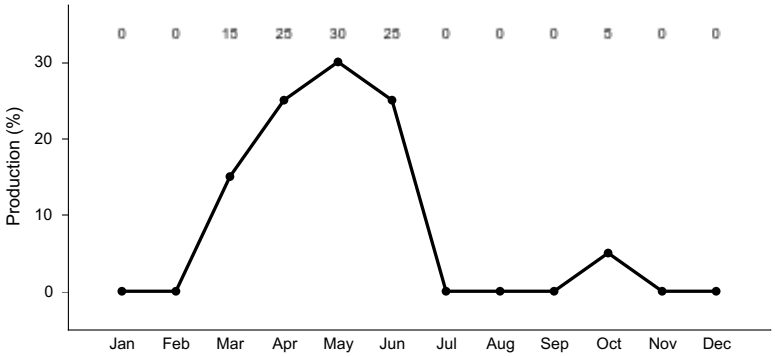


Figure 5. Plant community growth curve (percent production by month). ID0605, ARTRW8 -PSSPS . State 1.

Community 1.3
Bluebunch wheatgrass - Sandberg bluegrass

This plant community is dominated by bluebunch wheatgrass and Sandberg bluegrass. Some Thurber's needlegrass may be lost due to fire. Bottlebrush squirreltail, streambank wheatgrass, and thickspike wheatgrass have increased. Forbs and basin wildrye remain about in the same proportion as Plant Community A. Very little Wyoming big sagebrush is present due to wildfire, but some rabbitbrushes and horsebrush are present due to sprouting. Threetip sagebrush may increase from sprouting if present in the community. Some cheatgrass has invaded the site. This plant community is the result of wildfire.

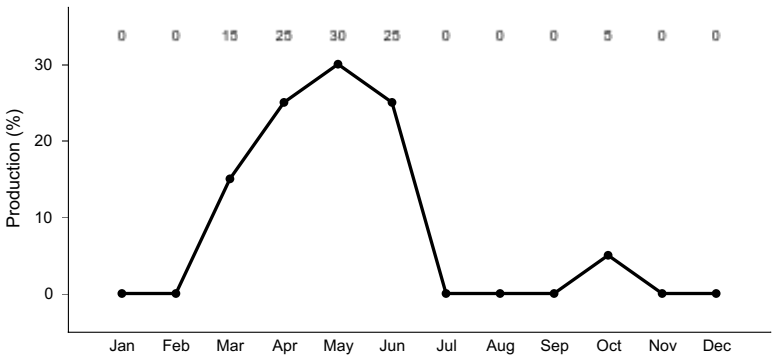


Figure 6. Plant community growth curve (percent production by month). ID0605, ARTRW8 -PSSPS . State 1.

State 2
Shortgrass Annuals

Community 2.1
Sandberg Bluegrass- Annuals

This plant community is dominated by Sandberg bluegrass, cheatgrass and other annuals. Root sprouting shrubs such as rabbitbrushes, horsebrush and threetip sagebrush can be present, dependent upon, how frequent, fire has occurred. Some soil loss has occurred. This state has developed due to frequent fires or improper grazing management. The site has crossed the threshold. It is generally not economically feasible to move this state back to State 1 with accelerated practices.

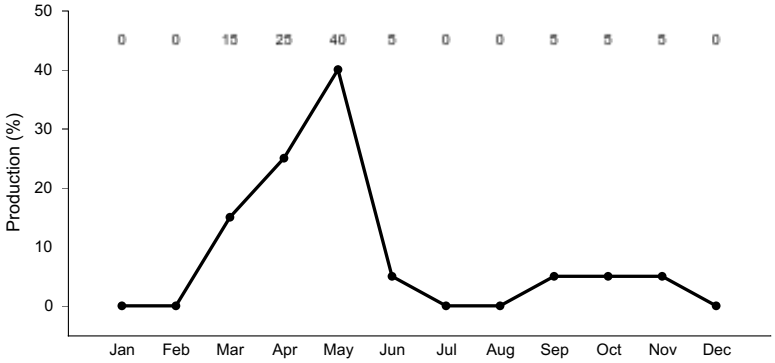


Figure 7. Plant community growth curve (percent production by month). ID0611, POSE/ BRTE/ ANNUALS . State 2.

State 3
Seeded

Community 3.1
Seeded

This plant community is dominated by seeded species. The seeding may be introduced species or natives to mimic the HCPC.

State 4
Unknown or New Site

Community 4.1
Unknown or 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 generally not economically feasible to move this state back to State 1 with accelerated practices.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**grass**			191–572	
	bluebunch wheatgrass	PSSPS	*Pseudoroegneria spicata ssp. spicata*	135–404	–

	wheatgrass				
	Thurber's needlegrass	ACTH7	*Achnatherum thurberianum*	56–168	–
2	**Grass/Grasslike**			11–258	
	Sandberg bluegrass	POSE	*Poa secunda*	34–101	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	1–45	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	1–45	–
	needle and thread	HECO26	*Hesperostipa comata*	1–45	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	1–22	–
	squirreltail	ELEL5	*Elymus elymoides*	1–22	–
	basin wildrye	LECI4	*Leymus cinereus*	1–11	–
Forb					
3	**Forbs**			67–224	
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	17–45	–
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	1–28	–
	nineleaf biscuitroot	LOTR2	*Lomatium triternatum*	1–22	–
	beardtongue	PENST	*Penstemon*	1–22	–
	spiny phlox	PHHO	*Phlox hoodii*	1–22	–
	longleaf phlox	PHLO2	*Phlox longifolia*	1–22	–
	foothill deathcamas	ZIPA2	*Zigadenus paniculatus*	1–11	–
	tailcup lupine	LUCA	*Lupinus caudatus*	1–11	–
	oblongleaf bluebells	MEOB	*Mertensia oblongifolia*	1–11	–
	buckwheat	ERIOG	*Eriogonum*	1–11	–
	cushion buckwheat	EROV	*Eriogonum ovalifolium*	1–11	–
	shaggy fleabane	ERPU2	*Erigeron pumilus*	1–11	–
	yellow fritillary	FRPU2	*Fritillaria pudica*	1–11	–
	Macdougal's biscuitroot	LOFOM	*Lomatium foeniculaceum ssp. macdougalii*	1–11	–
	broadfruit mariposa lily	CANI	*Calochortus nitidus*	1–11	–
	longspike Indian paintbrush	CAPIL	*Castilleja pilosa var. longispica*	1–11	–
	woollypod milkvetch	ASPU9	*Astragalus purshii*	1–11	–
	aster	ASTER	*Aster*	1–11	–
	pale agoseris	AGGL	*Agoseris glauca*	1–11	–
	tapertip onion	ALAC4	*Allium acuminatum*	1–11	–
	low pussytoes	ANDI2	*Antennaria dimorpha*	1–11	–
	lesser rushy milkvetch	ASCO12	*Astragalus convallarius*	1–11	–
	freckled milkvetch	ASLE8	*Astragalus lentiginosus*	1–6	–
	little larkspur	DEBI	*Delphinium bicolor*	1–6	–
Shrub/Vine					
4	**Shrubs**			112–314	
	Wyoming big sagebrush	ARTRW8	*Artemisia tridentata ssp. wyomingensis*	78–235	–
	threetip sagebrush	ARTR4	*Artemisia tripartita*	1–39	–

	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	1–28	–
	shadscale saltbush	ATCO	*Atriplex confertifolia*	1–22	–
	basin big sagebrush	ARTRT	*Artemisia tridentata ssp. tridentata*	1–11	–
	yellow rabbitbrush	CHVIV4	*Chrysothamnus viscidiflorus ssp. viscidiflorus var. viscidiflorus*	1–11	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	1–11	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	1–11	–
	antelope bitterbrush	PUTR2	*Purshia tridentata*	1–11	–
	spineless horsebrush	TECA2	*Tetradymia canescens*	1–6	–
	thorn skeletonweed	PLSP7	*Pleiacanthus spinosus*	1–6	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	1–6	–

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 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 include pygmy rabbit, burrowing owl, great basin ground squirrel, and Townsend pocket gopher. 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 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. Water features are sparse provided by seasonal streams, artificial water catchments, and springs. 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 the Cave Obligate Harvestman.

State 1 Phase 1.1 - Wyoming Big Sagebrush/ Bluebunch Wheatgrass/ Thurber's Needlegrass 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. 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 (lek sites, nesting areas, winter cover and food) for sage-grouse is provided by this diverse plant community. The plant community supports seasonal (spring through early winter) needs of large mammals (mule deer, antelope, and elk), with Wyoming big sagebrushproviding food and cover. A diverse small mammal population including golden-mantled ground squirrels, chipmunks, yellow-bellied marmots, and pygmy rabbits would utilize this plant community.

State 1 Phase 1.2 - Wyoming Big Sagebrush/ Sandberg Bluegrass/ Bottlebrush Squirreltail 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. An increase in threetip sagebrush may occur leading to a further increase in sagebrush canopy cover. The reduced herbaceous understory results in lower diversity of insects. Diversity of reptiles may decline due to a less diverse prey base. Reduced herbaceous understory is a key factor in limiting the use of this plant community by ground nesting bird species. Shrub-steppe obligate avian species include Brewer's sparrow, sage sparrow, sage thrasher, and sage-grouse. Habitat (lek sites, nesting areas, winter cover and food) for sage-grouse is limited due to a less diverse herbaceous plant community. A decrease in herbaceous understory and increase in three-tip sagebrush reduces the forage value of the plant community for mule deer,

antelope, and elk. Thermal and young of year cover would be provided for large mammals. A diverse small mammal population including golden-mantled ground squirrels, chipmunks, yellow-bellied marmots, and pygmy rabbits would utilize this plant community.

State 1 Phase 1.3 - Bluebunch Wheatgrass/ Sandberg Bluegrass/ Bottlebrush Squirreltail Plant Community: This plant community is the result of frequent fire. The plant community, dominated by herbaceous vegetation with little or no sagebrush provides less vertical structure and limits use by animals dependent on shrub cover. Insect diversity would be reduced but a diverse native forb plant community would still support select pollinators. 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 limited brood-rearing habitat for sage-grouse if sagebrush cover is adjacent to the site. The site would not provide suitable winter or nesting cover for sage-grouse. The herbaceous vegetation improves habitat for grassland avian species (horned lark and western meadowlark). Large mammal (mule deer, antelope, and elk) use for foraging would be seasonal (spring through fall) but the site would offer little thermal cover and young of year cover. Small mammal diversity would be reduced and the plant community would not provide suitable habitat for pygmy rabbits. This plant community could exhibit an increase in three-tip sagebrush. When the three-tip cover increases a limited amount of cover would be provided for reptiles, birds and large mammals listed above.

State 2 - Sandberg Bluegrass/ Cheatgrass 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 populations of small mammals would be dominated by grassland species like the Columbian ground squirrel. This plant community could exhibit an increase in three-tip sagebrush. When the three-tip cover increases a limited amount of cover would be provided for reptiles, birds, and large mammals listed above.

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 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:

There are few limitations to grazing. The site is suited for grazing in the spring, early summer, and fall for livestock. The distance to water may be a problem in some areas and water developments may be necessary. Water hauling is also an option. This site is often the key area in a management program.
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 less than 2% of the annual water budget. Ponding and flooding generally do not occur on this site. Run-on from adjacent sites normally does not occur.

State 1, Community Phase 1.1
In HCPC, 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 at lower slopes. When runoff does occur, modeling indicates it is typically in late spring and is associated with snowmelt or rainfall on frozen soils. Occasional large thunderstorms will generate runoff in summer. Potential for runoff increases as aerial cover and microtopography decrease. Higher runoff volumes are positively correlated with increasing bare ground and steepness of slope, and may occur on sites with these characteristics. Typically, 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. Rill erosion is the dominant process on steeper sites, but sediment is usually deposited on lower slopes and does not reach area streams. Deep percolation (<1% of water budget) does not generally occur on these low precipitation sites, especially where soils are deeper or underlain by bedrock. . Good grazing management that addresses frequency, duration, and intensity of grazing can keep fine fuels from developing, maintain normal levels of litter, and promote the production and vigor of existing native bunchgrasses. Trampling and overgrazing can result in rapid and possibly permanent loss of the cryptogam cover, which can increase the potential for wind erosion, and open crusts are a microenvironment for the establishment of winter annual aliens.

State 1, Community Phase 1.2
Increasing sagebrush density and cover, due to the lack of fire or improper grazing management, is associated with a change in hydrologic function. 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 when runoff does occur. The loss of vigorous deep-rooted bunchgrasses in conjunction with invading annual grasses will typically increase the seasonal variability of infiltration and runoff as compared to HCPC. 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, which could alter hydrologic function over time.

State 1, Community Phase 1.3
Fire can reduce infiltration and increase runoff and erosion causing reduced site productivity and contributing to water quality impacts in the short term. Runoff can be generated more quickly and in greater volume after fire, leading to erosion and flooding concerns. 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. 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 as vegetation cover increases. Recovered sites with bluebunch wheatgrass dominating the understory

have good hydrologic function. Gradual increases in Wyoming big sagebrush along with fine fuels management will reduce fire frequency over time. 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 bareground on these frequently burned sites. In heavy stands of cheatgrass and other annual species, runoff potential is reduced during spring and early summer. However, these sites will demonstrate significant variability in infiltration and runoff due to seasonal changes in cover. 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. Snow accumulation may be reduced since there are insufficient shrubs to prevent drifting, and earlier meltoff is probable without shrub cover. Sediment yields increase as rill processes become dominant, even on lower slopes. With improper grazing management, trail areas become compacted, leading to further rilling 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 HCPC 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

This site has very little recreational value except for off-road vehicle use. It has some spring blooming flowers which offer slight aesthetic value and some photographic opportunities. It has some value for hunting of antelope, coyotes, and rabbits. The site has very little value for picnicking or camping. It has little aesthetic appeal or natural beauty except where it is adjacent to lava flows.

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
Leah Juarros, Resource Soil Scientist, NRCS, Idaho
Joe May, State Rangeland Management Specialist, NRCS, Idaho
Lee Brooks, Range Management Specialist, IASCD

Type locality

Location 1: Power County, ID	
Township/Range/Section	T6 R28 S24
Latitude	43° 35′ 21″
Longitude	113° 6′ 44″
General legal description	6S, 28E SW ¼, Sec. 24 (Little Crater Kipuka) Field Offices Arco, ID Rexburg, ID St. Anthony, ID Idaho Falls, ID Blackfoot, ID Pocatello, ID American Falls, ID

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Contributors

Dave Franzen
DLF

Approval

Kirt Walstad, 3/11/2025

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)	Dave Franzen and Jacy Gibbs.
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Date	03/27/2007

Approved by	Kirt Walstad
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 they do occur they are most likely to be on slopes greater than 15% and immediately following wildfire. Gravels on the surface reduce erosion.

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2. **Presence of water flow patterns:** Water-Flow Patterns: rarely occur on this site except on slopes greater than 15%. When they do occur, they are short, disrupted by cool season perennial grasses and tall shrubs and are not extensive.

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3. **Number and height of erosional pedestals or terracettes:** Pedestals and/or Terracettes: are rare on this site. In areas of greater than 15% slopes where flow patterns and/or rills are present, a few pedestals and terracettes 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):** Bare Ground: ranges from 30-40 percent.

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

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6. **Extent of wind scoured, blowouts and/or depositional areas:** Wind-Scoured, Blowouts and/or Deposition Areas: usually not present. Immediately following wildfire some soil movement may occur on lighter textured soils.

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7. **Amount of litter movement (describe size and distance expected to travel):** Litter Movement: fine litter in the interspaces may move up to 2 feet or further 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):** Soil Surface Resistance to Erosion: 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):** Soil Surface Loss or Degradation: The surface horizon is typically 2 to 7 inches thick. Structure typically includes weak thin and moderately thick platy, weak fine and moderate fine granular, and weak fine to medium subangular blocky. Soil organic matter (SOM) ranges from 1 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:** Plant Community Composition and Distribution Relative to Infiltration: bunchgrasses, especially deep-rooted perennials, slow run-off and increase infiltration. Shrubs accumulate snow in the interspaces. Terracettes provide a favorable micro-site for vegetation establishment, which further increases infiltration.

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

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

    Dominant: Functional/Structural Groups: cool season deep-rooted perennial bunchgrasses >>tall shrubs> perennial forbs> shallow rooted grasses.

    Sub-dominant:

    Other:

    Additional:

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

14. **Average percent litter cover (%) and depth (in):** Litter Amount: annual litter cover in the interspaces will be 5-10 percent to a depth of <0.1". Under the mature shrubs litter is greater than 0.5 inches. Fine litter can accumulate on the terracettes.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Annual Production: is 750 lbs. per acre in a year with normal precipitation and temperatures. Perennial grasses produce 50-65 percent of the total, forbs 10-20 percent, and shrubs 15-30 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 Plants: cheatgrass, scotch thistle, mustard, halogeton, spotted and diffuse knapweed. Russian thistle and kochia can invade at lower elevations.

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