USDA Natural Resources Conservation Service

Ecological site R032XY104WY
Clayey (Cy) 5-9” Big Horn Basin Precipitation Zone

Accessed: 05/21/2025

General information

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

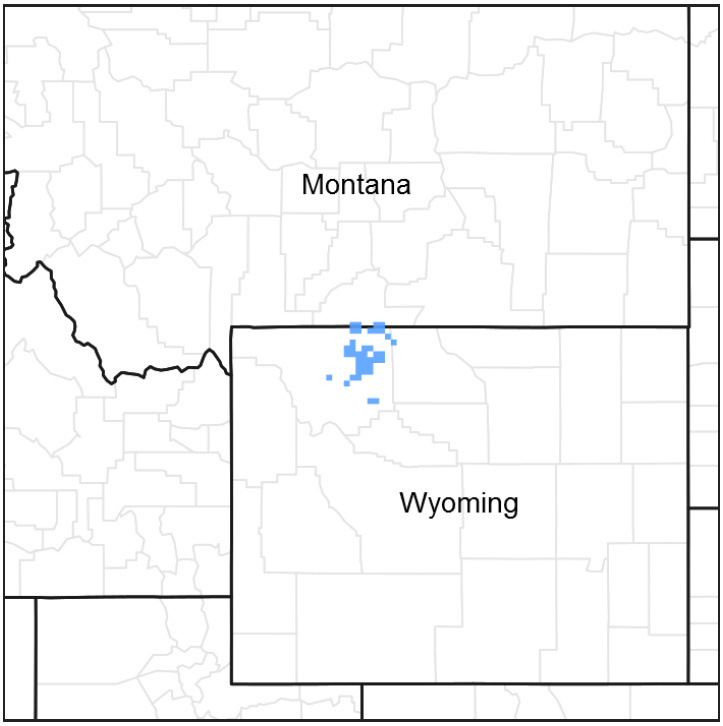

Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

Associated sites

R032XY138WY	**Saline Lowland (SL) 5-9” Big Horn Basin Precipitation Zone**
R032XY144WY	**Saline Upland (SU) 5-9” Big Horn Basin Precipitation Zone**
R032XY150WY	**Sandy (Sy) 5-9” Big Horn Basin Precipitation Zone,**

R032XY158WY	**Shallow Clayey (SwCy) 5-9” Big Horn Basin Precipitation Zone**

Similar sites

R032XY304WY	**Clayey (Cy) 10-14" East Precipitation Zone** Clayey 10-14" Foothills & Basins East has higher production.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site occurs on nearly level to 30% slopes.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Alluvial fan (3) Stream terrace
Flooding duration	Extremely brief (0.1 to 4 hours)
Flooding frequency	None to rare
Ponding duration	Brief (2 to 7 days)
Ponding frequency	None to occasional
Elevation	3,700–6,000 ft
Slope	0–30%
Ponding depth	0 in
Aspect	Aspect is not a significant factor

Climatic features

Annual precipitation ranges from 5-9 inches per year. The normal precipitation pattern shows peaks in May and June and a secondary peak in September. This amounts to about 50% of the mean annual precipitation. Much of the moisture that falls in the latter part of the summer is lost by evaporation and much of the moisture that falls during the winter is lost by sublimation. Average snowfall is about 20 inches annually. Wide fluctuations may occur in yearly precipitation and result in more dry years than those with more than normal precipitation.

Temperatures show a wide range between summer and winter and between daily maximums and minimums, due to the high elevation and dry air, which permits rapid incoming and outgoing radiation. Cold air outbreaks from Canada in winter move rapidly from northwest to southeast and account for extreme minimum temperatures. Chinook winds may occur in winter and bring rapid rises in temperature. Extreme storms may occur during the winter, but most severely affect ranch operations during late winter and spring.

High winds are generally blocked from the basin by high mountains, but can occur in conjunction with an occasional thunderstorm.

Growth of native cool-season plants begins about April 1 and continues to about July 1. Cool weather and moisture in September may produce some green up of cool season plants that will continue to late October.

The following information is from the “Emblem” climate station:

Minimum Maximum 5 yrs. out of 10 between
Frost-free period (days): 98 171 May 13 – September 19
Freeze-free period (days): 120 184 May 1 – October 5
Mean Annual Precipitation (inches): 3.22 10.97

Mean annual precipitation: 7.42 inches
Mean annual air temperature: 45.01 F (31.2 F Avg. Min. to 58.7 F Avg. Max.)
For detailed information visit the Natural Resources Conservation Service National Water and Climate Center at http://www.wcc.nrcs.usda.gov/ website. Other climate station(s) representative of this precipitation zone include” Basin”, “Deaver”, "Lovell”, and “Worland”.

Table 3. Representative climatic features

Frost-free period (average)	134 days
Freeze-free period (average)	152 days
Precipitation total (average)	7 in

Influencing water features

Soil features

The soils of this site are moderately deep (greater than 20” to bedrock) to very deep, moderately well to well-drained soils that formed in alluvium or alluvium over residuum. These soils have slow to moderate permeability. The surface soil will vary from 2 to 5 inches deep. These soils may develop severe cracks. The soil characteristics having the most influence on plants are the heavy texture, available moisture, and potential for elevated quantities of soluble salts.

Table 4. Representative soil features

Surface texture	(1) Clay loam (2) Clay (3) Silty clay loam
Family particle size	(1) Clayey
Drainage class	Moderately well drained to well drained
Permeability class	Slow to moderate
Soil depth	20–60 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	3–6 in
Calcium carbonate equivalent (0-40in)	0–5%
Electrical conductivity (0-40in)	0–4 mmhos/cm
Sodium adsorption ratio (0-40in)	0–12
Soil reaction (1:1 water) (0-40in)	7.4–9
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

Potential vegetation on this site is dominated by mid cool-season perennial grasses. Other significant vegetation includes big sagebrush, winterfat, birdfoot sagebrush, and a variety of forbs. The expected potential composition for this site is about 70% grasses, 10% forbs and 20% woody plants. The composition and production will vary naturally due to historical use, fluctuating precipitation and fire frequency.

As this site deteriorates species such as blue grama, birdfoot sagebrush, and big sagebrush will increase. Weedy annuals will invade. Cool-season grasses such as bluebunch wheatgrass, western wheatgrass, bottlebrush squirreltail, and Indian ricegrass will decrease in frequency and overall production.

Big sagebrush may become dominant on some areas with an absence of fire. Wildfires are actively controlled in recent times so chemical control using herbicides has replaced the

historic role of fire on this site. Recently, prescribed burning has regained some popularity.

Due to the amount and pattern of the precipitation, the big sagebrush component typically is not resilient once it has been removed if a healthy and vigorous stand of grass exists and is maintained. The exception to this is where the herbaceous component is severely degraded at the time of treatment, growing conditions are unfavorable after treatment, and/or recovery periods are inadequate due to poor grazing management.

The Historic Climax Plant Community (description follows the plant community diagram) has been determined by study of rangeland relic areas, or areas protected from excessive disturbance. Trends in plant communities going from heavily grazed areas to lightly grazed areas, seasonal use pastures, and historical accounts have also been used.

The following is a State and Transition Model Diagram that illustrates the common plant communities (states) that can occur on the site and the transitions between these communities. The ecological processes will be discussed in more detail in the plant community narratives following the diagram.

State and transition model

Ecosystem states

1. Rhizomatous Wheatgrasses/Bottlebrush squirreltail

2. Perennial Grass/Mixed Shrub

3. Mixed Shrub/Bare Ground

4. Blue grama Sod

5. Salt Tolerant Shrub/Bare Ground

6. Salt Tolerant Shrub/Rhizomatous wheatgrasses

State 1 submodel, plant communities

1.1. Rhizomatous Wheatgrasses/Bottlebrush squirreltail

State 2 submodel, plant communities

2.2. Perennial Grass/Mixed Shrub

State 3 submodel, plant communities

3.3. Mixed Shrub/Bare Ground

State 4 submodel, plant communities

4.4. Blue grama Sod

State 5 submodel, plant communities

5.5. Salt Tolerant Shrub/Bare Ground

State 6 submodel, plant communities

6.6. Salt Tolerant Shrub/Rhizomatous wheatgrasses

State 1
Rhizomatous Wheatgrasses/Bottlebrush squirreltail

Community 1.1
Rhizomatous Wheatgrasses/Bottlebrush squirreltail

The interpretive plant community for this site is the Historic Climax Plant Community. This state evolved with grazing by large herbivores and periodic fires. The cyclical nature of the fire regime in this community prevented big sagebrush from being the dominant landscape. This plant community can be found on areas that are properly managed with grazing and/or prescribed burning, and on areas receiving occasional short periods of rest. Potential vegetation is about 70% grasses or grass-like plants, 10% forbs, and 20% woody plants. Cool season mid-grasses dominate the state. The major grasses include bluebunch wheatgrass, rhizomatous wheatgrasses, bottlebrush squirreltail, and Indian ricegrass. Other grasses occurring in this state include Sandberg bluegrass and blue grama. Woody species are a conspicuous element of this state, and occurs in mosaic patterns across the site. Big sagebrush can make up to 10% of the annual production and winterfat can make up to 5%. Natural fire occurred frequently in this community and prevents big sagebrush from becoming a dominant species. A variety of forbs also occurs in this state and plant diversity is high (see Plant Composition Table). The total annual production (air-dry weight) of this state is about 375 pounds per acre, but it can range from about 225 lbs. /acre in unfavorable years to about 600 lbs. /acre in above average years. The state is stable and well adapted to the Northern Intermountain Desertic Basins climatic conditions. The diversity in plant species allow for high drought resistance. This is a sustainable plant community (site/soil stability, watershed function, and biologic integrity). Transitions or pathways leading to other plant communities are as follows: • Drought and moderate season long grazing with the absence of fire, will convert this plant community to the Perennial Grass/Mixed Shrub Plant Community.

Figure 5. Plant community growth curve (percent production by month). WY0501, 5-9BH Upland sites. Monthly percentages of total annual growth for all upland sites with dominantly C3 Cool season plants..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			15	50	20	5		10			

State 2
Perennial Grass/Mixed Shrub

Community 2.1
Perennial Grass/Mixed Shrub

Historically, this plant community evolved under grazing by large ungulates and a low fire frequency. Currently, this site is normally found under a moderate, season-long grazing regime and in the absence of fire or brush control. Prolonged drought can also play an important role and will exacerbate these conditions. Big sagebrush and birdfoot sagebrush are important components of this plant community. Cool-season grasses make up the majority of the understory with the balance made up of short warm-season grasses, annual cool-season grass, and miscellaneous forbs. Dominant grasses include bluebunch wheatgrass, rhizomatous wheatgrasses, and bottlebrush squirreltail. Forbs commonly found in this plant community, include fringed sagewort, hairy goldenaster, phlox, wild onion, plains spring parsley, and scarlet globemallow. The annual production of shrubs has increased as compared to the HCPC and may become as much as 25% of the total of the percentage composition of the plant community. The overstory of sagebrush and understory of grass and forbs provide a diverse plant community. When compared to the Historic Climax Plant Community, big sagebrush and blue grama have increased. Plains pricklypear cactus will also have increased, but occurs only in small patches. Indian ricegrass has decreased and may occur in only trace amounts under the sagebrush canopy or within the patches of pricklypear. In addition, winterfat may or may not have changed depending on the season of use. The total annual production (air-dry weight) of this state is about 240 pounds per acre, but it can range from about 150 lbs./acre in unfavorable years to about 400 lbs./acre in above average years. This plant community is resistant to change. The herbaceous species present are well adapted to grazing; however, species composition can be altered through long-term overgrazing. The herbaceous component is mostly intact and plant vigor and replacement capabilities are sufficient. Water flow patterns and litter movement may be occurring but only on steeper slopes. Incidence of pedestalling is minimal. Soils are mostly stable and the surface shows minimum soil loss. The watershed is functioning and the biotic community is intact. Transitional pathways leading to other plant communities are as follows: • Prescribed grazing or possible long-term prescribed grazing will return this state to near Historic Climax Plant Community. The probability of this occurring is high especially if rotational grazing along with short deferred grazing is implemented as part of prescribed method of use. In addition, the removal of fire suppression will allow a somewhat natural fire regime to reoccur to more easily transition between this plant community and the HCPC. A prescribed fire treatment can be useful to hasten this transition if desired. • Frequent and severe grazing with the absences of fire on less saline soils will convert this plant community to a Mixed Shrub/Bare Ground Vegetation State. • Frequent and severe grazing plus no fire on more saline soils will convert this state to Salt Tolerant Shrub/Bare Ground Vegetative State.

Figure 6. Plant community growth curve (percent production by month).

WY0501, 5-9BH Upland sites. Monthly percentages of total annual growth for all upland sites with dominantly C3 Cool season plants..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			15	50	20	5		10			

State 3
Mixed Shrub/Bare Ground

Community 3.1
Mixed Shrub/Bare Ground

This plant community evolved under frequent and severe grazing with the absence of fire. Big sagebrush is the dominant species of this plant community. Cool-season grasses have been mostly eliminated and if still present can only be found under the sagebrush canopy. The interspaces between plants have expanded leaving the amount of bare ground more prevalent and more soil surface exposed to erosive elements. The dominant grasses are Sandberg bluegrass, and blue grama. Weedy annual species such as cheatgrass have invaded if a seed source is available. Cactus and sageworts often increase. Noxious weeds such as Russian knapweed, leafy spurge, or Canada thistle may invade the site. Plant diversity is moderate to poor. When compared with the HCPC or the Mixed Shrub/ Perennial Grass Plant Communities, the annual production is similar, as the shrub production compensates for the decline in the herbaceous production. The total annual production (air-dry weight) of this state is about 250 pounds per acre, but it can range from about 175 lbs./acre in unfavorable years to about 325 lbs./acre in above average years. This plant community is resistant to change as the stand becomes more decadent. These areas may actually be more resistant to fire as less fine fuels are available and the bare ground between the sagebrush plants is increased. Continued frequent and severe grazing or the removal of grazing does not seem to affect the plant composition or structure of the plant community. Plant diversity is moderate to low. The plant vigor is diminished and replacement capabilities are limited due to the reduced number of cool-season grasses. Plant litter is noticeably less when compared to the HCPC. Soil erosion is accelerated because of increased bare ground. Water flow patterns and pedestalling are obvious. Infiltration is reduced and runoff is increased. Rill channels may be noticeable in the interspaces and gullies may be establishing where rills have concentrated down slope. Transitional pathways leading to other plant communities are as follows: • Brush Management or wildfire followed by frequent and severe grazing, will convert this plant community to a Blue Grama Sod Plant Community. • Brush management, followed by prescribed grazing and seeding if necessary, will return this plant community at or near the HCPC. If prescribed fire is used as a means to reduce or remove the shrubs, sufficient fine fuels will need to be present. This may require deferment from grazing prior to treatment. Post management is critical to ensure success. This can range from two or more years of rest to partial growing season deferment, depending on the condition of the understory at the time of treatment and the growing conditions following treatment. In the case of an intense wildfire that occurs when desirable plants are not completely dormant,

the length of time required to reach the HCPC may be increased and seeding of natives are recommended.

Figure 7. Plant community growth curve (percent production by month). WY0501, 5-9BH Upland sites. Monthly percentages of total annual growth for all upland sites with dominantly C3 Cool season plants..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			15	50	20	5		10			

State 4
Blue grama Sod

Community 4.1
Blue grama Sod

This plant community is the result of frequent and severe yearlong grazing. Soils on these sites are usually less saline. It is dominated by a dense sod of blue grama and includes a mosaic shrub overstory. Big sagebrush may be present but usually birdfoot sagebrush is the most important shrub in this plant community. Pricklypear cactus can become dense in areas so that livestock cannot graze forage growing within the cactus clumps. When compared with the Historic Climax Plant Community warm season grasses have replaced most cool season midgrasses. Blue grama, upland sedges, and pricklypear have increased. All cool-season mid-grasses, forbs, and most shrubs have been greatly reduced. Production has been significantly decreased. The total annual production (air-dry weight) of this state is about 75 pounds per acre, but it can range from about 50 lbs./acre in unfavorable years to about 150 lbs./acre in above average years. This sod is extremely resistant to change and continued frequent and severe grazing or the removal of grazing does not seem to affect the plant composition or structure of the plant community. The biotic integrity of this state is not functional and plant diversity is extremely low. Plant vigor is significantly weakened and replacement capabilities are limited due to the reduced number of cool-season grasses. This state is stable and protected from excessive erosion. The sod formed by these grasses is resistant to water infiltration. While the soil is protected by this sod, excessive runoff may occur off-site. As a result, rills or other more severe erosion can occur on the adjoining sites. The watershed may or may not be functioning, as runoff may affect adjoining sites. The biotic integrity of this plant community is not intact. Transitional pathways leading to other plant communities are as follows: • Grazing land mechanical treatment (chiseling and seeding, etc.) followed by prescribed grazing will return this plant community to near Historic Climax Plant Community.

Figure 8. Plant community growth curve (percent production by month). WY0501, 5-9BH Upland sites. Monthly percentages of total annual growth for all upland sites with dominantly C3 Cool season plants..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			15	50	20	5		10			

State 5
Salt Tolerant Shrub/Bare Ground

Community 5.1
Salt Tolerant Shrub/Bare Ground

This plant community can occur where states are subjected to continuous yearlong grazing and where soils are influenced by elevated amount of soluble salts. Salt tolerant shrubs are a significant component of the plant community and the preferred cool season grasses have been eliminated or greatly reduced. Wyoming big sagebrush is still a component of the plant community but does not dominate the overstory shrub species. This site is dominated by an overstory of shrubs, which can vary widely in composition and production. This variation results from the dissimilarity in quantity of soluble salts present in the soils and the availability of shrubs to occupy the site. The dominant shrubs are big sagebrush, rubber rabbitbrush, greasewood and a number of different saltbushes. Perennial cool season mid-grasses have been removed leaving mostly patches of blue grama and annuals. Cheatgrass and weedy annual forbs such as halogeton, Russian thistle, and kochia, will occupy the site if a seed source is available. Noxious weeds such as Russian knapweed may also invade this site. When compared to the HCPC, grass production has diminished but is compensated by the increase in shrub production. The plant species, however, are completely distinct. The interspaces between plants have expanded leaving the amount of bare ground more prevalent. Surface salts have increased, especially on sites dominated by greasewood and saltbushes. The leaves of these plants contain high amounts of sodium and other salts, and when shed these soluble salts are transferred to the soils underneath the plants. Consequently, the soil can exhibit wide variations in soluble salts, which causes the variation in shrub composition. The total annual production (air-dry weight) of this state is about 200 pounds per acre, but it can range from about 75 lbs./acre in unfavorable years to about 275 lbs./acre in above average years. This plant community is resistant to change. These areas are actually more resistant to fire as less fine fuels are available and the bare ground between the shrubs has increased. Continued frequent and severe grazing or the removal of grazing does not seem to affect the composition or structure of the plant community. Plant diversity is moderate to poor. The biotic integrity of this state is mostly dysfunctional because of the predominant salt tolerant shrub overstory and absence of perennial cool-season grasses. Soil erosion is accelerated because of increased bare ground. Water flow patterns and pedestalling are obvious. Infiltration is reduced and runoff is increased. Rill channels may be noticeable in the interspaces and gullies may be establishing where rills have concentrated down slope. Transitions or pathways leading to other plant communities are as follows: • Prescribed grazing or possibly long-term prescribed grazing, will convert this plant community to the Salt Tolerant Shrub/Rhizomatous Wheatgrass Vegetative State.

Recovery to near Historic Climax Plant Community condition is difficult to impossible due to the resistance of these shrubs to herbicides and other brush management techniques. In addition, the increase in surface salts has had accumulated effects on the soil so most of the herbaceous plants associated with the HCPC are no longer suitable for this site. The most notable exception is the rhizomatous wheatgrasses and bottlebrush squirreltail. Soil remediation to reduce the surface salts is not recommended, as this is mostly ineffective and extremely costly. Seeding more salt-tolerant native grasses and forbs will improve the productivity of site and plant cover.

Figure 9. Plant community growth curve (percent production by month). WY0501, 5-9BH Upland sites. Monthly percentages of total annual growth for all upland sites with dominantly C3 Cool season plants..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			15	50	20	5		10			

State 6
Salt Tolerant Shrub/Rhizomatous wheatgrasses

Community 6.1
Salt Tolerant Shrub/Rhizomatous wheatgrasses

This plant community can occur where the Salt Tolerant/Bare Ground Plant Community prescribed grazing management is implemented. Salt tolerant shrubs and Wyoming big sagebrush still remain a significant component of the plant community but preferred cool season grasses have reestablished. This site is dominated by an overstory of a variety of shrubs, such as Wyoming big sagebrush, rubber rabbitbrush, greasewood, and a variety of saltbushes. Some perennial cool season mid-grasses have once again reestablished such as rhizomatous wheatgrasses and bottlebrush squirreltail. Other grasses include Sandberg bluegrass and blue grama. Patches of annuals such as cheatgrass and other weedy annual forbs such as halogeton, Russian thistle, and kochia, will persist on this site. Noxious weeds such as Russian knapweed may also remain if not treated. The interspaces between plants will have diminished in size. When compared with the HCPC or the Mixed Shrub/ Perennial Grass Plant Communities, the annual production is similar, but the species are different. The total annual production (air-dry weight) of this state is about 275 pounds per acre, but it can range from about 200 lbs./acre in unfavorable years to about 425 lbs./acre in above average years. This plant community is mostly resistant to change, but species composition can be altered through long-term overgrazing. The herbaceous component is stable and plant vigor and replacement capabilities are sufficient. The biotic community is not intact because of the predominant salt tolerant shrub overstory and the lack of cool-season mid grasses. Plant diversity is moderate Soils are mostly stable and recent soil loss is minimal. The remnant evidence of erosion should not be confused with current erosion processes. Water flow patterns and litter movement is stable but is still occurring on steeper slopes. Incidence of pedestalling is improving. The watershed may or may not be functioning Transitions or pathways leading to other plant

communities are as follows: • Frequent and severe grazing will convert the plant community to the Salt Tolerant Shrub/Bare Ground Plant Community. • Recovery to near Historic Climax Plant Community condition is difficult to impossible due to the resistance of these shrubs to herbicides and other brush management techniques. In addition, the increase in surface salts has had accumulated effects on the soil so most of the herbaceous plants associated with the HCPC are no longer suitable for this site. The most notable exception is the rhizomatous wheatgrasses and bottlebrush squirreltail. Soil remediation to reduce the surface salts is not recommended, as this is mostly ineffective and extremely costly. Seeding more salt-tolerant grasses and forbs will improve the productivity of site and plant cover, but will not improve the biotic integrity.

Figure 10. Plant community growth curve (percent production by month). WY0501, 5-9BH Upland sites. Monthly percentages of total annual growth for all upland sites with dominantly C3 Cool season plants..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			15	50	20	5		10			

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1				19–56	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	19–56	–
2				56–113	
	western wheatgrass	PASM	*Pascopyrum smithii*	56–113	–
3				56–113	
	squirreltail	ELELE	*Elymus elymoides ssp. elymoides*	56–113	–
4				19–56	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	19–56	–
5				0–56	
	Grass, perennial	2GP	*Grass, perennial*	0–19	–
	blue grama	BOGR2	*Bouteloua gracilis*	0–19	–
	sedge	CAREX	*Carex*	0–19	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–19	–
	Sandberg	POSE	*Poa secunda*	0–19	–

	Sandberg bluegrass	POSE	*Poa secunda*	0–19	
Forb					
6				19–56	
	Forb, perennial	2FP	*Forb, perennial*	0–19	–
	textile onion	ALTE	*Allium textile*	0–19	–
	desertparsley	LOMAT	*Lomatium*	0–19	–
	phlox	PHLOX	*Phlox*	0–19	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	0–19	–
Shrub/Vine					
7				0–38	
	big sagebrush	ARTR2	*Artemisia tridentata*	0–38	–
8				0–19	
	birdfoot sagebrush	ARPE6	*Artemisia pedatifida*	0–19	–
9				0–19	
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0–19	–
10				0–19	
	winterfat	KRASC	*Krascheninnikovia*	0–19	–
11				0–19	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–19	–

Animal community

Rhizomatous Wheatgrasses/Bottlebrush Squirreltail (HCPC) : The predominance of grasses in this plant community favors grazers and mixed-feeders, such as bison, elk, and antelope. Suitable thermal and escape cover for deer may be limited due to the low quantities of woody plants. However, topographical variations could provide some escape cover. When found adjacent to sagebrush dominated states, this plant community may provide brood rearing/foraging areas for sage grouse, as well as lek sites. Other birds that would frequent this plant community include Western meadowlarks, horned larks, and golden eagles. Many grassland obligate small mammals would occur here.

Perennial Grass/Mixed Shrub Plant Community: The combination of an overstory of sagebrush and an understory of grasses and forbs provides a very diverse plant community for wildlife. The crowns of sagebrush tend to break up hard crusted snow on winter ranges, so mule deer and antelope may use this state for foraging and cover year-round, as would cottontail and jack rabbits. It provides important winter, nesting, brood-

rearing, and foraging habitat for sage grouse. Brewer's sparrows nest in big sagebrush plants, and a host of other nesting birds utilize stands in the 20-30% cover range.

Mixed Shrub/Bare Ground Plant Community: This plant community can provide important winter foraging for elk, mule deer and antelope, as sagebrush can approach 15% protein and 40-60% digestibility during that time. This community provides excellent escape and thermal cover for large ungulates, as well as nesting habitat for upland game birds. However, it provides little foraging opportunities for upland game birds, as fewer forbs are available. Many grassland obligate small mammals would occur here.

Blue Grama Sod Plant Community: These communities provide limited foraging for antelope and other grazers. They may be used as a foraging site by sage grouse if proximal to woody cover and if the Historic Climax Plant Community or the Big Sagebrush/Perennial Grass Plant Community is limited. Generally, these are not target plant communities for wildlife habitat management.

Salt Tolerant Shrub/Bare Ground Plant Community: This plant community exhibits a low level of plant species diversity due to the accumulation of salts near the soil surface. It does, however, provide thermal and escape cover for large animals and upland birds. Upland game birds may find little foraging opportunities, as fewer forbs are available. Many grassland obligate small mammals would occur here.

Salt Tolerant Shrub/Rhizomatous Wheatgrass Plant Community: This plant community can provide winter foraging for elk, mule deer and antelope. This community provides escape and thermal cover for large ungulates, as well as nesting habitat for upland game birds. However, it provides little foraging opportunities for upland game birds, as fewer forbs are available. Many grassland obligate small mammals would occur here.

Animal Community – Grazing Interpretations

The following table lists suggested stocking rates for cattle under continuous season-long grazing under normal growing conditions. These are conservative estimates that should be used only as guidelines in the initial stages of the conservation planning process. Often, the current plant composition does not entirely match any particular plant community (as described in this ecological site description). Because of this, a field visit is recommended, in all cases, to document plant composition and production. More precise carrying capacity estimates should eventually be calculated using this information along with animal preference data, particularly when grazers other than cattle are involved. Under more intensive grazing management, improved harvest efficiencies can result in an increased carrying capacity. If distribution problems occur, stocking rates must be reduced to maintain plant health and vigor.

Plant Community	Production (lb./ac)	Carrying Capacity* (AUM/ac)
Historic Climax Plant Community	200-500	.20
Perennial Grasses/Mixed Shrub	150-400	.16

Mixed Shrub/Bare Ground 75-325 .10
Blue Grama Sod 50-150 .05
Salt Tolerant Shrub/Bare Ground 75-275 .07
Salt Tolerant Shrub/Rhizomatous Wheatgrasses 200-425 .16

* - Continuous, season-long grazing by cattle under average growing conditions.

Grazing by domestic livestock is one of the major income-producing industries in the area. Rangeland in this area may provide yearlong forage for cattle, sheep, or horses. During the dormant period, the forage for livestock use needs to be supplemented with protein because the quality does not meet minimum livestock requirements.

Hydrological functions

Water is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group C, with localized areas in hydrologic group D. Infiltration ranges from slow to moderately slow. Runoff potential for this site varies from moderate to high depending on soil hydrologic group and ground cover. In many cases, areas with greater than 75% ground cover have the greatest potential for high infiltration and lower runoff. An example of an exception would be where short-grasses form a strong sod and dominate the site. Areas where ground cover is less than 50% have the greatest potential to have reduced infiltration and higher runoff (refer to Part 630, NRCS National Engineering Handbook for detailed hydrologic information).

Rills and gullies should not typically be present. Water flow patterns should be barely distinguishable if at all present. Pedestals are only slightly present in association with bunchgrasses. Litter typically falls in place, and signs of movement are not common. Chemical and physical crusts are rare to non-existent. Cryptogamic crusts are present, but only cover 1-2% of the soil surface.

Recreational uses

This site provides hunting opportunities for upland game species. The wide variety of plants which bloom from spring until fall have an esthetic value that appeals to visitors.

Wood products

No appreciable wood products are present on the site.

Other products

None noted.

Inventory data references

Information presented here has been derived from NRCS inventory data. Field observations from range trained personnel were also used. Other sources used as references include: USDA NRCS Water and Climate Center, USDA NRCS National Range and Pasture Handbook, and USDA NRCS Soil Surveys from various counties.
Inventory Data References
Data Source Number of Records Sample Period State County
SCS-RANGE-417 19 1965-1986 WY Park & others

State Correlation
This site occurs entirely within Wyoming.

Field Offices
Cody, Greybull, Lovell, Powell, Thermopolis, Worland

Contributors

Ray Gullion

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)	Ray Gullion
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Date	02/19/2008
Approved by	E. Bainter
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills should not be present

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2. **Presence of water flow patterns:** Barely observable

3. **Number and height of erosional pedestals or terracettes:** Essentially non-existent

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is 25-35% occurring in small areas throughout site

5. **Number of gullies and erosion associated with gullies:** Active gullies should not be present

6. **Extent of wind scoured, blowouts and/or depositional areas:** None

7. **Amount of litter movement (describe size and distance expected to travel):** Little to no plant litter movement. Plant litter remains in place and is not moved by erosional forces.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Plant cover and litter is at 60% or greater of soil surface and maintains soil surface integrity. Soil Stability class is anticipated to be 5 or greater.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Use Soil Series description for depth and color of A-horizon

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Grass canopy and basal cover should reduce raindrop impact and slow overland flow providing increased time for infiltration to occur. Healthy deep rooted native grasses enhance infiltration and reduce runoff. Infiltration is Slow.

11. **Presence and thickness of compaction layer (usually none; describe soil profile**

features which may be mistaken for compaction on this site): No compaction layer or soil surface crusting should be 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:

    Sub-dominant:

    Other:

    Additional: Mid stature Cool Season Rhizomatous Grasses > Mid stature Cool Season Bunch Grasses > Shrubs > Short stature Grasses > Forbs

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Very Low

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14. **Average percent litter cover (%) and depth (in):** Average litter cover is 20-30% with depths of 0.1 to 0.25 inch

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 300 lbs/ac

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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:** Birdfoot sagebrush, blue grama, prickly pear, big sagebrush, annuals, exotics, and Species found on Noxious Weed List

17. **Perennial plant reproductive capability:** All species are capable of reproducing.