

## United States Department of Agriculture Natural Resources Conservation Service

### Ecological Site Description

**Site Type:** Rangeland

**Site Name:** Shallow Loamy (SwLy) 10-14” Foothills and Basins East Precipitation Zone

**Site ID:** R032XY362WY

**Major Land Resource Area:** 32 – Northern Intermountain Desertic Basins

### Physiographic Features

This site occurs on steep slopes and ridge tops, but may occur on all slopes.

**Landform:** Hillsides, ridges and escarpments

**Aspect:** N/A

	<u>Minimum</u>	<u>Maximum</u>
<b>Elevation (feet):</b>	5400	7500
<b>Slope (percent):</b>	0	45
<b>Water Table Depth (inches):</b>	None within 60 inches	
<b>Flooding:</b>		
<b>Frequency:</b>	None	None
<b>Duration:</b>	None	None
<b>Ponding:</b>		
<b>Depth (inches):</b>	0	0
<b>Frequency:</b>	None	None
<b>Duration:</b>	None	None
<b>Runoff Class:</b>	negligible	high

### Climatic Features

Annual precipitation ranges from 10-14 inches per year. The normal precipitation pattern shows the least amount of precipitation in December, January, and February, increasing to a peak during the latter part of May. Amounts decrease through June, July, and August and then increase some in September. 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 exceeds 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.

Winds are generally not strong as compared to the rest of the state. Daytime winds are generally stronger than nighttime and occasional strong storms may bring brief periods of high winds with gusts to more than 75 mph.

Growth of native cool-season plants begins about April 15 and continues to about July 15. 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 “Thermopolis 2” climate station:

	<u>Minimum</u>	<u>Maximum</u>	<u>5 yrs. out of 10 between</u>
<b>Frost-free period (days):</b>	74	149	May 23 – September 16
<b>Freeze-free period (days):</b>	112	180	May 8 – October 1
<b>Annual Precipitation (inches):</b>	7.6	21.9	

Mean annual precipitation: 12.35 inches

Mean annual air temperature: 46.2 °F (30.1°F Avg. Min. to 62.3°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 “Grass Creek 1E”, “Thermopolis”, Thermopolis 25NW”, “Buffalo Bill Dam” and “Black Mountain”.

## Influencing Water Features

<b>Wetland Description:</b>	<u>System</u>	<u>Subsystem</u>	<u>Class</u>	<u>Sub-class</u>
None	None	None	None	None

**Stream Type:** None

## Representative Soil Features

The soils of this site are shallow (less than 20”to bedrock) well-drained soils formed in alluvium over residuum or in residuum. These soils have moderately slow to moderate permeability and may occur on all slopes. The bedrock may be any kind which is virtually impenetrable to plant roots, except igneous. The surface soil will have one or more of the following textures: very fine sandy loam, loam, silt loam, sandy clay loam, silty clay loam, and clay loam. Thin ineffectual layers of other textures are disregarded. The soil characteristics having the most influence on the plant community are the shallow depth, and potential for elevated quantities of soluble salts.

Major Soil Series correlated to this site include: Blazon, Stutzman, Dalhquist, Brownsto, Thermopolis, Blazon, Shingle, Pensore, Cragosen, Rootel, Pilotpeak, Asholler

Other Soil Series in MLRA 32 correlated to this site include:

**Parent Material Kind:** residuum, alluvium

**Parent Material Origin:** sandstone, shale

**Surface Texture:** loam, silt loam, clay loam, sandy clay loam

**Surface Texture Modifier:** none

**Subsurface Texture Group:** loam, clay loam, sandy clay loam, silty loam

**Surface Fragments ≤ 3” (% Cover):** 0 to 10

**Surface Fragments > 3” (%Cover):** 0 to 10

**Subsurface Fragments ≤ 3” (% Volume):** 0 to 15

**Subsurface Fragments > 3” (% Volume):** 0

	<u>Minimum</u>	<u>Maximum</u>
<b>Drainage Class:</b>	well	well
<b>Permeability Class:</b>	moderately slow	moderate
<b>Depth (inches):</b>	10	20
<b>Electrical Conductivity (mmhos/cm) <math>\leq 20</math>"</b> :	0	8
<b>Sodium Absorption Ratio <math>\leq 20</math>"</b> :	0	13
<b>Soil Reaction (1:1 Water) <math>\leq 20</math>"</b> :	7.4	9.0
<b>Soil Reaction (0.1M CaCl<sub>2</sub>) <math>\leq 20</math>"</b> :	NA	NA
<b>Available Water Capacity (inches) <math>\leq 30</math>"</b> :	0.56	6.3
<b>Calcium Carbonate Equivalent (percent) <math>\leq 20</math>"</b> :	0	15

## Plant Communities

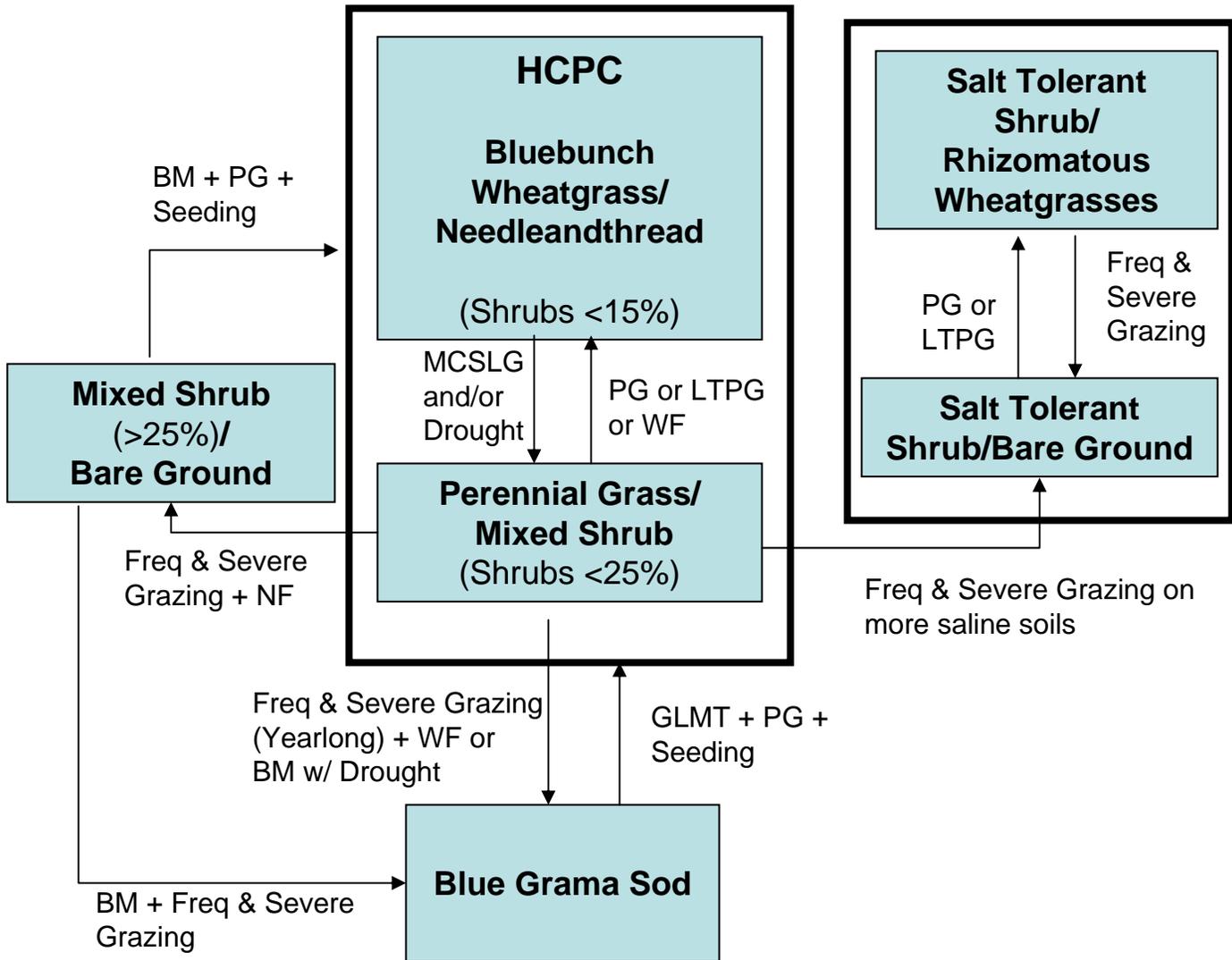
### Ecological Dynamics of the Site:

Potential vegetation on this site is dominated by mid cool-season perennial grasses. Other significant vegetation includes winterfat, big sagebrush, and a variety of forbs. The expected potential composition for this site is about 75% grasses, 10% forbs and 15% 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, Sandberg bluegrass, and big sagebrush will increase. Plains pricklypear and weedy annuals will invade. Cool season grasses such as bluebunch and or Griffith's wheatgrasses, and Indian ricegrass will decrease in frequency and production.

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.



- BM** - Brush Management (fire, chemical, mechanical)
- Freq. & Severe Grazing** - Frequent and Severe Utilization of the Cool-season Mid-grasses during the Growing Season
- GLMT** - Grazing Land Mechanical Treatment
- LTPG** - Long-term Prescribed Grazing
- MCSLG** - Moderate, Continuous Season-long Grazing
- NU, NF** - No Use and No Fire
- PG** - Prescribed Grazing (proper stocking rates with adequate recovery periods during the growing season)
- VLTPG** - Very Long-term Prescribed Grazing (could possibly take generations)
- WF** - Wildfire (Natural or Human Caused)

**Plant Community Composition and Group Annual Production**  
**Reference Plant Community (HCPC)**

COMMON NAME/GROUP NAME	SCIENTIFIC NAME	SYMBOL	Annual Production (Normal Year)		
			Group	lbs./acre	% Comp.
			Total: 500		
<b>GRASSES AND GRASS-LIKES</b>					
<b>GRASSES/GRASSLIKES</b>					
Griffiths wheatgrass or	Elymus albicans	ELAL7	1	125 - 250	25 - 50
Bluebunch wheatgrass	Pseudoroegneria spicata	PSSP6			
Needleandthread grass	Hesperostipa comata	HECO26	2	25 - 75	5 - 15
Indian ricegrass	Achnatherum hymenoides	ACHY	3	25 - 50	5 - 10
Prairie junegrass	Koeleria macrantha	KOMA	4	25 - 50	5 - 10
Rhizomatous wheatgrass	Pascopyrum smithii	PASM	5	25 - 50	5 - 10
<b>MISC. GRASSES/GRASSLIKES</b>			<b>6</b>	<b>25 - 75</b>	<b>5 - 15</b>
Blue grama	Bouteloua gracilis	BOGR2	6	0 - 25	0 - 5
Bottlebrush squirreltail	Elymus elymoides	ELEL5	6	0 - 25	0 - 5
Canby bluegrass	Poa canbyi (syn. P. secunda)	POCA(POSE)	6	0 - 25	0 - 5
Green needlegrass	Nassella viridula	NAVI4	6	0 - 25	0 - 5
Sandberg bluegrass	Poa secunda	POSE	6	0 - 25	0 - 5
Spikefescue	Leucopoa kingii	LEKI2	6	0 - 25	0 - 5
Upland sedges	Carex spp.	CAREX	6	0 - 25	0 - 5
other perennial grasses (native)		2GP	6	0 - 25	0 - 5
<b>FORBS</b>			<b>7</b>	<b>0 - 50</b>	<b>0 - 10</b>
Basin rayless daisy	Erigeron spp.	ERIGE2	7	0 - 25	0 - 5
Fleabanes	Erigeron spp.	ERIGE2	7	0 - 25	0 - 5
Fringed sagewort	Artemisia frigida	ARFR4	7	0 - 25	0 - 5
Little larkspur	Delphinium bicolor	DEBI	7	0 - 25	0 - 5
Missouri milkvetch	Astragalus missouriensis	ASMI10	7	0 - 25	0 - 5
Paintbrush	Castilleja spp.	CAST	7	0 - 25	0 - 5
Penstemon	Penstemon spp.	PENST	7	0 - 25	0 - 5
Phlox	Phlox spp.	PHLOX	7	0 - 25	0 - 5
Pussytoes	Antennaria rosea	ANRO2	7	0 - 25	0 - 5
Scarlet globemallow	Sphaeralcea coccinea	SPCO	7	0 - 25	0 - 5
Sulphur flower buckwheat	Eriogonum umbellatum	ERUM	7	0 - 25	0 - 5
Thrift mock goldenweed	Stenotus armerioides	STAR10	7	0 - 25	0 - 5
Wild onion	Allium textile	ALTE	7	0 - 25	0 - 5
other perennial forbs (native)		2FP	7	0 - 25	0 - 5
<b>TREES/SHRUBS</b>			<b>8</b>	<b>25 - 100</b>	<b>5 - 20</b>
Big sagebrush	Artemisia tridentata	ARTR2	8	0 - 25	0 - 5
Black sagebrush	Artemisia nova	ARNO4	8	0 - 25	0 - 5
Green rabbitbrush	Chrysothamnus viscidiflorus	CHVI8	8	0 - 25	0 - 5
Winterfat	Krascheninnikovia lanata	KRAL2	8	0 - 25	0 - 5
other shrubs & half shrubs (native)		2SHRUB	8	0 - 25	0 - 5

This list of plants and their relative proportions are based on near normal years. Fluctuations in species composition and relative production may change from year to year dependent upon precipitation or other climatic factors.

**Plant Community Narratives**

Following are the narratives for each of the described plant communities. These plant communities may not represent every possibility, but they probably are the most prevalent and repeatable plant communities. The plant composition tables shown above have been developed from the best available knowledge at the time of this revision. As more data is collected, some of these plant communities may be revised or removed, and new ones may be added. None of these plant communities should necessarily be thought of as “Desired Plant Communities”. According to the USDA NRCS National Range and Pasture Handbook, Desired Plant Communities (DPC’s) will be determined by the decision-makers and will meet minimum quality criteria established by the NRCS. The main purpose for including any description of a plant community here is to capture the current knowledge and experience at the time of this revision.

**Bluebunch Wheatgrass/Needleandthread Plant Community**

The interpretive plant community for this site is the Historic Climax Plant Community. This state evolved with grazing by large herbivores, soils less than 20 inches, and periodic fires. The cyclical nature of the fire regime in this community prevents big sagebrush from being the dominant species. 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 75% grasses or grass-like plants, 10% forbs, and 15% woody plants. Cool season midgrasses dominate the state.

The major grasses include bluebunch wheatgrass, needleandthread, Indian ricegrass, and rhizomatous wheatgrass. Other grasses occurring on the state include Sandberg bluegrass, prairie junegrass, and bottlebrush squirreltail. Green needlegrass and spikefescue occur in the upper limit of this precipitation zone. Black and big sagebrush are conspicuous elements of this state, which can make up 10% of the annual production. 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 500 pounds per acre, but it can range from about 350 lbs./acre in unfavorable years to about 700 lbs./acre in above average years.

The following is the growth curve of this plant community expected during a normal year:

Growth curve number:

Growth curve name:

Growth curve description:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	0	5	25	40	10	5	10	5	0	0

(Monthly percentages of total annual growth)

The state is extremely stable and well adapted to the Northern Intermountain Desertic Basins climate. The diversity in plant species allows 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:

- Moderate, continuous season-long grazing will convert the plant community to the *Perennial Grass/Mixed Shrub Plant Community*. Prolonged drought will exacerbate this transition.

**Perennial Grass/Mixed Shrub Plant Community**

Historically, this plant community evolved under grazing and a low fire frequency. Currently, it is found under moderate, season-long grazing by livestock and will be exacerbated by prolonged drought conditions. In addition, the fire regime for this site has been modified and extended periods

without fire are now common. This plant community is still dominated by cool-season grasses, while short warm-season grasses and miscellaneous forbs account for the balance of the understory. A variety of shrubs is now a conspicuous part of the overall production.

The dominant grasses include bluebunch and Griffith's wheatgrasses, rhizomatous wheatgrasses, and needleandthread. Grasses and grass-like species of secondary importance include prairie junegrass, blue grama, Sandberg bluegrass, and threadleaf sedge. Green needlegrass and spikefescue occur on sites in the upper limit of this precipitation zone. Forbs commonly found in this plant community include scarlet globemallow, fringed sagewort, fleabanes, leafy wildparsley, and phlox. Big sagebrush, black sagebrush, green rabbitbrush and winterfat dominate the overstory. Shrubs can make up to 20% of the annual production. The overstory of shrubs and understory of grass and forbs provide a diverse plant community.

When compared to the Historic Climax Plant Community, shrubs, prairie junegrass, and blue grama have increased. Plains pricklypear cactus may also have invaded, but occurs only in small patches. Indian ricegrass and bluebunch and/or Griffiths wheatgrasses has decreased and Indian ricegrass may occur in only trace amounts under the sagebrush canopy or within the patches of pricklypear. In addition, the amount of 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 425 pounds per acre, but it can range from about 250 lbs./acre in unfavorable years to about 650 lbs./acre in above average years.

The following is the growth curve of this plant community expected during a normal year:

Growth curve number:

Growth curve name:

Growth curve description:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	0	5	25	40	10	5	10	5	0	0

(Monthly percentages of total annual growth)

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.

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 *HCPC*. The probability of this occurring is high especially if rotational grazing along with short deferred grazing is implemented as part the 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 plus no fire on less saline soils will convert the plant community to the *Mixed Shrub/Bare Ground Plant Community*. The probability of this occurring is high, especially evident on areas with historically higher precipitation and where drought or heavy browsing does not adversely impact the sagebrush stand.

- Frequent and severe grazing (yearlong grazing) plus wildfire or brush control, will convert the plant community to the *Blue Grama Sod Plant Community*. The probability of this occurring is high, especially if the sagebrush stand has been severely affected by drought or heavy use or has been removed altogether.
- Frequent and severe grazing on more saline soils, will convert the plant community to the *Salt Tolerant Shrub/Bare Ground Plant Community*. The probability of this occurring is high especially on soils with elevated salts and if the sagebrush stand has been severely affected by drought and heavy use or has been removed altogether.

**Mixed Shrub/Bare Ground Community**

This plant community is the result of frequent and severe grazing and protection from fire. Soils on these sites are typically low in soluble salts. Shrubs and especially sagebrush dominate this plant community, as the annual production of sagebrush exceeds 20%. Shrubs are significant components of the plant community and the preferred cool season grasses have been eliminated or greatly reduced.

The dominant grasses/grasslikes are prairie junegrass, Sandberg bluegrass, threadleaf sedge, and blue grama. Weedy annual species such as cheatgrass may occupy the site if a seed source is available. Cactus often invades. Noxious weeds such as Russian knapweed, leafy spurge, or Canada thistle may invade the site if a seed source is available. The interspaces between plants have expanded leaving the amount of bare ground more prevalent. As compared with the HCPC or the Perennial Grass/Mixed Shrub Plant Communities, the annual production is reduced, but the shrub production compensates for some of 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 150 lbs./acre in unfavorable years to about 350 lbs./acre in above average years.

The following is the growth curve of the plant community expected during a normal year:

Growth curve number:

Growth curve name:

Growth curve description:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	0	5	25	40	10	5	10	5	0	0

(Monthly percentages of total annual growth)

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 composition or structure of the plant community. Plant diversity is moderate to poor.

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:

- Brush management, followed by prescribed grazing, will return this plant community at or near the HCPC. Reseeding after brush management with native species may be necessary to ensure a more rapid transition. 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 is recommended.

- Brush management, or an intense wildfire followed by frequent and severe grazing, will convert the plant community to the *Blue Grama Sod Plant Community*.

**Blue Grama Sod Plant Community**

This plant community is the result of frequent and severe yearlong grazing, which has adversely affected the perennial grasses as well as the shrub component. Other factors that can affect the shrubs include drought, heavy browsing, wildfires, and/or human brush control measures. A dense sod of blue grama with patches of threadleaf sedge dominates this site. Pricklypear cactus can become dense enough in patches so that livestock cannot graze forage growing within the cactus clumps. Sagebrush has been significantly reduced and in some cases removed.

When compared to the Historic Climax Plant Community, blue grama and threadleaf sedge have increased. Weedy annual species may also dominate and exist in large patches. These include cheatgrass, Russian thistle, and annual mustards. All cool-season mid-grasses and forbs have been greatly reduced and the shrub component is lacking. Total production has been significantly decreased.

The total annual production (air-dry weight) of this state is about 150 pounds per acre, but it can range from about 100 lbs./acre in unfavorable years to about 250 lbs./acre in above average years.

The following is the growth curve of this plant community expected during a normal year:

Growth curve number:

Growth curve name:

Growth curve description:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	0	5	25	40	10	5	10	5	0	0

(Monthly percentages of total annual growth)

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.

This sod bound plant community is very resistant to water infiltration. While this sod protects the site itself, areas amid these patches or off-site areas are affected by excessive runoff that can cause rills and gully erosion. Water flow patterns are obvious in the bare ground areas and pedestalling is apparent along the sod edges. Rill channels are noticeable in the interspaces and down slope. The watershed may or may not be functioning, as runoff may affect adjoining sites.

Transitions or pathways leading to other plant communities are as follows:

- Grazing land mechanical treatment (chiseling, etc.) and pricklypear cactus control (if needed), followed by prescribed grazing, will return this plant community to near *Historic Climax Plant Community* condition. Reseeding with natives is often needed to hasten this transition.

**Salt Tolerant Shrub/Bare Ground Plant Community**

This plant community can occur on sites subjected to frequent and severe grazing and on soils influenced by elevated amounts of soluble salts. Salt tolerant shrubs replace Wyoming big sagebrush as the major overstory species while the preferred cool season grasses have been eliminated or greatly reduced. Bare ground and weedy grasses and forbs dominate the understory.

This site is dominated by an overstory of salt tolerant shrubs, such as greasewood, birdfoot sagebrush and saltbushes, which can vary widely in their composition and production. The leaves of some of these plants contain high amounts of sodium and other salts, and when shed these soluble salts are transferred to the soil underneath the plants. Consequently, the soil can exhibit wide variations in soluble salts, which can explain the variation in shrub composition. Big sagebrush and rubber rabbitbrush are present but are mostly in small patches.

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 the site. Plant diversity is moderate to poor.

When compared to the HCPC, grass production has diminished but is off set by the increase in shrub production. 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 total annual production (air-dry weight) of this state is about 225 pounds per acre, but it can range from about 125 lbs./acre in unfavorable years to about 300 lbs./acre in above average years.

The following is the growth curve of this plant community expected during a normal year:

Growth curve number:

Growth curve name:

Growth curve description:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	0	10	50	25	5	0	10	0	0	0

(Monthly percentages of total annual growth)

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. 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 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 exceptions are the rhizomatous wheatgrasses and bottlebrush squirreltail. Soil remediation to reduce the surface salts is mostly ineffective and extremely costly. Seeding more salt-tolerant native grasses and forbs will improve the productivity of the site and the plant cover.

**Salt Tolerant Shrub/Rhizomatous Wheatgrasses Plant Community**

This plant community can occur where prescribed grazing is implemented in the Salt Tolerant Shrub/Bare Ground Plant Community. Salt tolerant shrubs remain a significant component of the plant community, but cool season grasses have reestablished.

This site is dominated by an overstory of salt tolerant shrubs, such as greasewood and saltbushes, but can exhibit a wide variety of shrub composition and production. Some perennial cool season mid-grasses have once again reestablished such as rhizomatous wheatgrasses and bottlebrush squirreltail. Other important 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 reduced in size.

The total annual production (air-dry weight) of this state is about 350 pounds per acre, but it can range from about 250 lbs./acre in unfavorable years to about 450 lbs./acre in above average years.

The following is the growth curve of this plant community expected during a normal year:

Growth curve number:

Growth curve name:

Growth curve description:

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	0	5	25	40	10	5	10	5	0	0

(Monthly percentages of total annual growth)

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 watershed may or may not be functioning and the biotic community is not intact because of the predominant salt tolerant shrub overstory. Plant diversity is moderate

Soils are mostly stable and recent soil loss is minimal. This should not be confused with evidence of remnant erosion. Water flow patterns and litter movement is stable but is still occurring on steeper slopes. Incidence of pedestalling is improving.

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 mostly ineffective and extremely costly. Seeding more salt-tolerant grasses and forbs will improve the productivity of the site and the plant cover, but will not improve the biotic integrity.

## Ecological Site Interpretations

### Animal Community – Wildlife Interpretations

**Bluebunch Wheatgrass/Needleandthread (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 provide 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 hosts 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 sage grouse.

**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 Perennial Grass/ Mixed Shrub Plant Community is limiting. 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 may provide some thermal and escape cover for deer and antelope if no other woody community is nearby, but in most cases, it is not a desirable plant community to select as a wildlife habitat management objective.

**Salt Tolerant Shrub/Rhizomatous Wheatgrasses Plant Community:** The combination of an overstory of sagebrush and an understory of grasses and forbs provide 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 hosts of other nesting birds utilize stands in the 20-30% cover range.

Animal Preferences (Quarterly - 1,2,3,4) for commonly occurring plants in MLRA 32, 10-14 inch Foothills and Basins East

COMMON NAME/ GROUP NAME	SCIENTIFIC NAME	SCIENTIFIC SYMBOL	Cattle	Sheep	Horses	Mule Deer	Antelope	Elk	Moose	Mtn. Sheep
<b>GRASSES/GRASSLIKES</b>										
Alkali bluegrass	Poa juncea (syn. P. secunda)	POJU (POSE)	DDDD	PPPP	DDDD	PPPP	PPPP	DDDD	DDDD	DDDD
Alkali cordgrass	Spartina gracilis	SPGR	DDDD	UUUU	DDDD	UUUU	UUUU	DDDD	DDDD	UUUU
Alkali sacaton	Sporobolus airoides	SPA1	PPPP	DDDD	PPPP	DDDD	DDDD	PPPP	DDDD	DDDD
Baltic rush	Juncus balticus	JUBA	DDDD	UUUU	DDDD	UUUU	UUUU	DDDD	UUUU	UUUU
Basin wildrye	Leymus cinereus	LECI4	PPPP	PPPP	PPPP	DDDD	DDDD	PPPP	DDDD	PPPP
Big bluegrass	Poa Ampla (syn. P. secunda)	POAM (POSE)	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP
Blue grama	Bouteloua gracilis	BOGR2	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
Bluebunch wheatgrass	Pseudoroegneria spicata	PSSP6	PPPP	PPPP	PPPP	DDDD	DDDD	PPPP	PPPP	DDDD
Bluejoint reedgrass	Calamagrostis canadensis	CACAM	PPPP	DDDD	PPPP	UUUU	UUUU	PPPP	DDDD	DDDD
Bottlebrush squirreltail	Elymus elymoides	ELELE	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
Bulrush	Scirpus spp.	SCRIP	DDDD	UUUU	DDDD	UUUU	UUUU	DDDD	DDDD	DDDD
Canada wildrye	Elymus canadensis	ELCA4	PPPP	PPPP	PPPP	DDDD	DDDD	PPPP	PPPP	PPPP
Canby bluegrass	Poa canbyi (syn. to P. secunda)	POCA (POSE)	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP
Golden sedge	Carex aurea	CAAU3	DDDD	DDDD	DDDD	UUUU	UUUU	DDDD	UUUU	DDDD
Green needlegrass	Nassella viridula	NAV14	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP
Indian ricegrass	Achnatherum hymenoides	ACHY	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP
Inland saltgrass	Distichlis spicata	DISP	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Inland sedge	Carex interior	CAIN11	DDDD	DDDD	DDDD	UUUU	UUUU	DDDD	DDDD	DDDD
Mat muhly	Muhlenbergia richardsonis	MURI	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Griffith's wheatgrass	Elymus albicans	ELAL7	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
Nebraska sedge	Carex nebrascensis	CANE2	PPPP	PPPP	PPPP	DDDD	DDDD	PPPP	DDDD	DDDD
Needleandthread	Hesperostipa comata	HECO26	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP
Nuttall's alkaligrass	Puccinellia nuttalliana	PUNU2	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP
Prairie junegrass	Koeleria macrantha	KOMA	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
Prairie sandreed	Calamovilfa longifolia	CALO	PPPP	DDDD	PPPP	UUUU	UUUU	PPPP	DDDD	DDDD
Sandberg bluegrass	Poa secunda	POSE	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
Sand dropseed	Sporobolus cryptandrus	SPCR	DDDD	DDDD	DDDD	UUUU	UUUU	DDDD	UUUU	UUUU
Slender wheatgrass	Elymus trachycaulus	ELTR7	PPPP	DDDD	PPPP	DDDD	DDDD	PPPP	DDDD	DDDD
Slough sedge	Carex obnupta	CAOB3	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
Spike fescue	Leucophaea kingii	LEKI2	PPPP	DDDD	PPPP	PPPP	DDDD	PPPP	DDDD	DDDD
Streambank wheatgrass	Elymus lanceolatus	ELLAL3	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
Thickspike wheatgrass	Elymus lanceolatus	ELLAL3	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
Threadleaf sedge	Carex filifolia	CAFI	DDDD	DDDD	DDDD	DDDD	PPPP	DDDD	DDDD	DDDD
Tufted hairgrass	Deschampsia caespitosa	DECA18	PPPP	PPPP	PPPP	DDDD	DDDD	PPPP	DDDD	DDDD
Upland sedge	Carex spp.	CAREX	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
Water sedge	Carex aquatilis	CAAQ	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
Western wheatgrass	Pascopyrum smithii	PASM	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
<b>FORBS</b>										
Alkali seepweed	Suaeda vera	SUVE2	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
American bistort	Polygonum bistortoides	POBI16	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
Arrowgrass	Triglochin spp.	TRIGL	TTTT	TTTT	TTTT	TTTT	TTTT	TTTT	TTTT	TTTT
Asters	Eucephalus spp.	EUCEP2	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Biscuitroots	Lomatium spp.	LOMAT	DDDD	DDDD	UUUU	DDDD	DDDD	DDDD	DDDD	DDDD
Cinquefoil	Potentilla spp.	POTEN	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Deathcamas	Zigadenus Michx.	ZIGAD	TTTT	TTTT	TTTT	TTTT	TTTT	TTTT	TTTT	TTTT
Dock	Rumex spp.	RUMEX	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Evening primrose	Oenothera caespitosa	OECA10	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
False carrot	Turgenia spp.	TURGE	UUUU	DDDD	UUUU	UUUU	UUUU	UUUU	UUUU	DDDD
Fleabanes	Erigeron spp.	ERIGE2	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
Fringed sagewort	Artemisia frigida	ARFR4	UUUU	UUUU	UUUU	UUUU	DDDD	UUUU	UUUU	UUUU
Goldenweed	Stenotus acaulis	STAC	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Gromwell	Buglossoides arvensis	BUAR3	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Hawksbeard	Crepis acuminata	CRAC2	UUUU	PPPP	UUUU	DDDD	DDDD	UUUU	DDDD	DDDD
Horsetails	Equisetum spp.	EQUIS	UUUU	UUUU	TTTT	UUUU	UUUU	UUUU	UUUU	UUUU
Iris	Iris spp.	IRIS	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Larkspur	Delphinium spp.	DELPH	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
Milkvetch	Astragalus spp.	ASTRA	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
Painbrush	Castilleja spp.	CAST	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
Penstemons	Penstemon spp.	PENST	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP
Phlox	Phlox spp.	PHLOX	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Prairie thermopsis	Thermopsis rhombifolia	THRH	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Princessplume	Stanleya spp.	STANL	TTTT	TTTT	TTTT	TTTT	TTTT	TTTT	TTTT	TTTT
Nuttall's povertyweed	Monoecis nuttalliana	MONU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Pussytoes	Antennaria spp.	ANTEN	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Salsify	Tragopogon porrifolius	TRPO	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Scarlet globemallow	Sphaeralcea coccinea	SPCO	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
Stemless hymenoxys	Tetranneuris acaulis	TEACA2	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Wild onion	Allium textile	ALTE	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD
Winterfat	Krascheninnikovia lanata	KRAL2	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP
Woody aster	Xylorhiza spp.	XYLOR	TTTT	TTTT	TTTT	TTTT	TTTT	TTTT	TTTT	TTTT
Woolly groundsel	Packera cana	PACA15	TTTT	UUUU	TTTT	UUUU	UUUU	TTTT	UUUU	UUUU
<b>TREES, SHRUBS &amp; HALF-SHRUBS</b>										
Antelope bitterbrush	Purshia tridentata	PUTR2	PPPP	PPPP	DDDD	PPPP	PPPP	PPPP	PPPP	PPPP
Boxelder	Acer negundo L. var. interius	ACNE12	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Silver sagebrush	Artemisia cana	ARCA13	DDDD	DDDD	PPPP	PPPP	PPPP	DDDD	DDDD	DDDD
Big sagebrush	Artemisia tridentata	ARTR2	DDDD	DDDD	UUUU	DDDD	DDDD	DDDD	DDDD	DDDD
Birdfoot sagebrush	Artemisia pedatifida	ARPE6	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Black sagebrush	Artemisia nova	ARNO4	UUUU	PPPP	UUUU	PPPP	PPPP	UUUU	UUUU	DDDD
Cottonwoods (sprouts)	Populus spp.	POPUL	DDDD	DDDD	DDDD	DDDD	UUUU	DDDD	DDDD	UUUU
Curleaf mountainmahogany	Cercocarpus ledifolius	CELE3	PPPP	PPPP	DDDD	PPPP	UUUU	PPPP	PPPP	DDDD
Gardners saltbush	Atriplex gardneri	ATGA	PPPP	PPPP	DDDD	PPPP	PPPP	PPPP	PPPP	DDDD
Greasewood	Sarcobatus vermiculatus	SAVE4	DDDD	DDDD	UUUU	DDDD	DDDD	DDDD	UUUU	UUUU
Green rabbitbrush	Chrysothamnus viscidiflorus	CHVI8	PPPP	DDDD	PPPP	PPPP	PPPP	PPPP	DDDD	DDDD
Limber pine	Pinus flexilis	PINF2	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Rubber rabbitbrush	Ericameria nauseosa	ERNA10	UUUU	PPPP	UUUU	DDDD	PPPP	UUUU	UUUU	DDDD
Rocky Mountain juniper	Juniperus scopulorum	JUSC2	UUUU	UUUU	UUUU	DDDD	UUUU	UUUU	UUUU	UUUU
Shadscale	Atriplex confertifolia	ATCO	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
Shrubby cinquefoil	Dasiphora floribunda	DAFL3	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	DDDD	UUUU
Silver buffalobery	Shepherdia argentea	SHAR	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
skunkbush sumac	Rhus trilobata	RHTR	DDDD	DDDD	DDDD	DDDD	DDDD	DDDD	UUUU	UUUU
Snowberry	Symphoricarpos occidentalis	SYOC	UUUU	UUUU	UUUU	DDDD	UUUU	UUUU	UUUU	UUUU
Utah juniper	Juniperus osteosperma	JUOS	UUUU	UUUU	UUUU	DDDD	UUUU	UUUU	UUUU	UUUU
Wildrose	Rosa woodsii var. woodsii	ROWOW	DDDD	DDDD	UUUU	DDDD	DDDD	DDDD	DDDD	DDDD
Willows	Salix spp.	SALIX	PPPP	PPPP	DDDD	PPPP	UUUU	PPPP	PPPP	DDDD
Winterfat	Krascheninnikovia lanata	KRAL2	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP
Yucca	Yucca spp.	YUCCA	DDDD	DDDD	UUUU	DDDD	DDDD	DDDD	UUUU	DDDD

N = not used; U = undesirable; D = desirable; P = preferred; T = toxic

## 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	350-700	.20
Perennial Grass/Mixed Shrub	250-650	.17
Mixed Shrub/Bare Ground	150-350	.10
Blue Grama Sod	100-250	.05
Salt Tolerant Shrub/Bare Ground	125-300	.07
Salt Tolerant Shrub/Rhizomatous Wheatgrasses	250-450	.15

\* - 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.

## Hydrology Functions

Water is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group B and C, with localized areas in hydrologic group D. Infiltration ranges from moderate to moderately rapid. 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 hydrology 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 such as bluebunch wheatgrass. 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 varieties 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.

## Supporting Information

### Associated Sites

Shallow Sandy	032XY366WY
Loamy	032XY322WY
Gravelly	032XY312WY

### Similar Sites

() – Shallow Loamy 5-9" Wind River Basin P.Z.	032XY262WY
Shallow Loamy 5-9" Big Horn Basin P.Z.	032XY162WY

[Lower production than Shallow Loamy 10-14" E]

### Inventory Data References (narrative)

Information presented here has been derived from NRCS inventory data. Field observations from range trained personnel were also used. Those involved in developing this site include: Chris Krassin, Range Management Specialist, NRCS and Everet Bainter, Range Management Specialist. Other sources used as references include USDA NRCS Water and Climate Center, USDA NRCS National Range and Pasture Handbook, USDI and USDA Interpreting Indicators of Rangeland Health Version 3, and USDA NRCS Soil Surveys from various counties.

### Inventory Data References

Ocular field estimations observed by trained personnel.

### State Correlation

The site occurs entirely in Wyoming.

### Type Locality

### Field Offices

Casper, Cody, Dubois, Fort Washakie, Greybull, Lander, Powell, Riverton, Thermopolis, Worland,

### Relationship to Other Established Classifications

### Other References

### Site Description Approval

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State Range Management Specialist

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Date