United States Department of Agriculture
Natural Resources Conservation Service

Ecological Site Description

Site Type: Rangeland

Site Name: Gravelly Loamy 12-17" Precipitation Zone

Site ID: R067XY114WY

Major Land Resource Area: 67 – North Central High Plains

Physiographic Features

This site occurs on hills, ridges, terrace edges, and mountain slopes.

Landform: hill, ridges, terraces **Aspect:** N/A

	Minimum	Maximum
Elevation (feet):	4500	7500
Slope (percent):	0	50
Water Table Depth (inches):	none	none
Flooding:		
Frequency:	none	none
Duration:	none	none
Ponding:		
Depth (inches):	0	0
Frequency:	none	none
Duration:	none	none
Runoff Class:	negligible	medium

Climatic Features

Annual precipitation ranges from 12-17 inches per year. 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.

Wind speed averages about 8 mph, ranging from 10 mph during the spring to 7 mph during late summer. 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 1 and continues to about July 1. Native warm-season plants begin growth about May 15 and continue to about August 15. Green up of cool season plants may occur in September and October of most years.

The following information is from the "Lusk 2SW" climate station.

	Minimum	Maximum
Frost-free period (days):	74	148
Freeze-free period (days):	101	181
Mean Annual Precipitation (inches):	12	17

Mean annual precipitation: 15.71 inches
Mean annual air temperature: 45.2 °F (31.0°F Avg. Min. – 59.3°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: "Chugwater, Wheatland 4N, Cheyenne AP, and Scottsbluff WSO AP".

Influencing Water Features

Wetland Description:	System	Subsystem	Class	Sub-class
None	None	None	None	None

Stream Type: None (Rosgen System)

Representative Soil Features

The soils of this site are deep (greater than 40 inches) and well drained to excessively well drained. They formed in alluvium and colluvium from mixed rock.

Major Soil Series correlated to this site include: Willowman, Cascajo, Ipson, Nidix

Other Soil Series correlated to this site include: none

Parent Material Kind: alluvium, colluvium
Parent Material Origin: mixed rock
Surface Texture: loam, sandy loam, fine sandy loam
Surface Texture Modifier: gravelly, very cobbly
Subsurface Texture Group: loamy
Surface Fragments (% Cover): 10 - 25
Subsurface Fragments ≤ 3" (% Volume): 40 - 70

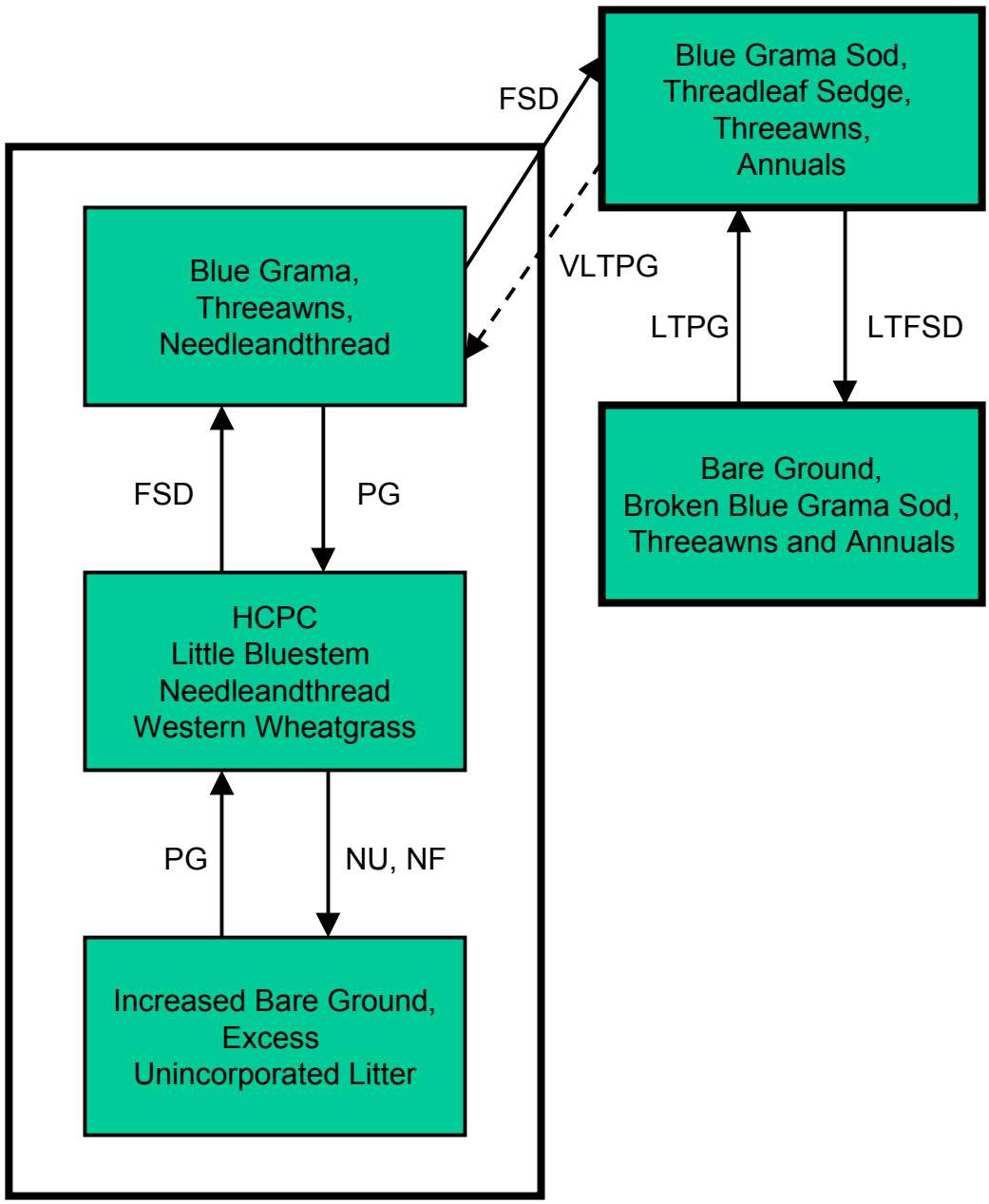
	Minimum	Maximum
Drainage Class:	well	excessively
Permeability Class:	moderately	rapid
Depth (inches):	40	>60
Electrical Conductivity (mmhos/cm) ≤20":	0	2
Sodium Absorption Ratio ≤20":	0	3
Soil Reaction (1:1 Water) ≤20":	6.6	8.4
Soil Reaction (0.1M CaCl2) ≤20":	N/A	N/A
Available Water Capacity (inches) ≤30":	1.0	3.0
Calcium Carbonate Equivalent (percent) ≤20":	0	15

Plant Communities

Ecological Dynamics of the Site
As this site begins to deteriorate from a combination of frequent and severe grazing during the growing season, grasses such as little bluestem, bluebunch wheatgrass, and side-oats grama will decrease in both frequency and production. Grasses such as blue grama, threeawns and threadleaf sedge will increase. Under continued frequent and severe defoliation, with no rest periods, rhizomatous wheatgrasses and needleandthread will also begin to decrease. If continued, the plant community will become sodbound, and all mid to tall grasses can eventually be removed from the plant community. Over the long-term, continuous use in combination with high stock densities will result in a broken sod, with areas of bare ground developing, and species such as cheatgrass and broom snakeweed invading.

The historic climax plant community (description follows the State and Transition Model 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 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.



FSD - Frequent and Severe Defoliation
HCPC - Historic Climax Plant Community
LTFSD - Long Term Frequent and Severe Defoliation
PG - Prescribed Grazing (proper stocking rates with adequate recovery periods during the growing season)
LTPG - Long-term Prescribed Grazing
VLTPG - Very Long-term Prescribed Grazing
NU, NF - No Use, No Fire

Plant Community Composition and Group Annual Production

Little Bluestem, Needleandthread, Western Wheatgrass (HCPC)

COMMON NAME/GROUP NAME	SCIENTIFIC NAME	SYMBOL	Annual Production (Normal Year) Total: 1000		
			Group	lbs./acre	% Comp.
GRASSES AND GRASS-LIKES					
COOL-SEASON MID-GRASSES			**1**	**400 - 450**	**40 - 45**
needleandthread	Hesperostipa comata	HECO26	1	300 - 350	30 - 35
Indian ricegrass	Achnatherum hymenoides	ACHY	1	50 100	5 - 10
green needlegrass	Nassella viridula	NAVI4	1	50 100	5 - 10
bluebunch wheatgrass	Pseudoroegneria spicata	PSSP6	1	0 - 100	0 - 10
RHIZOMATOUS WHEATGRASSES:			**2**	**200 - 250**	**20 - 25**
western wheatgrass	Pascopyrum smithii	PASM	2	200 - 250	20 - 25
thickspike wheatgrass	Elymus lanceolatus	ELLA3	2	0 - 50	0 - 5
WARM-SEASON MID-TALL GRASSES			**3**	**100 - 200**	**10 - 20**
little bluestem	Schizachyrium scoparium	SCSC	3	100 - 150	10 - 15
sideoats grama	Bouteloua curtipendula	BOCU	3	0 - 50	0 - 5
WARM-SEASON SHORT GRASSES			**4**	**50 - 100**	**5 - 10**
blue grama	Bouteloua gracilis	BOGR2	4	50 - 100	5 - 10
MISCELLANEOUS GRASSES			**5**	**50 - 100**	**5 - 10**
plains muhly	Muhlenbergia cuspidata	MUCU3	5	0 - 50	0 - 5
prairie junegrass	Koeleria macrantha	KOMA	5	0 - 50	0 - 5
prairie sandreed	Calamovilfa longifolia	CALO	5	0 - 50	0 - 5
sand dropseed	Sporobolus cryptandrus	SPCR	5	0 - 50	0 - 5
threeawns	Aristida spp.	ARIST	5	0 - 20	0 - 2
other perennial grasses (native)		2GP	5	0 - 50	0 - 5
SEDGES			**6**	**0 - 50**	**0 - 5**
threadleaf sedge	Carex filifolia	CAFI	6	0 - 50	0 - 5
other sedges	Carex spp.	CAREX	6	0 - 50	0 - 5
FORBS			**7**	**150 - 200**	**15 - 20**
buckwheats	Eriogonum spp.	ERIOG	7	0 - 20	0 - 2
deathcamas	Zigadenus spp.	ZIGAD	7	0 - 20	0 - 2
dotted gayfeather	Liatris punctata	LIPU	7	0 - 20	0 - 2
fringed sagewort	Artemisia frigida	ARFR4	7	0 - 20	0 - 2
hairy goldaster	Heterotheca villosa	HEVI4	7	0 - 20	0 - 2
Lambert's crazyweed	Oxytropis lambertii	OXLA3	7	0 - 20	0 - 2
larkspurs	Delphinium spp.	DELPH	7	0 - 20	0 - 2
milkvetches	Astragalus spp.	ASTRA	7	0 - 20	0 - 2
penstemons	Penstemon spp.	PENST	7	0 - 20	0 - 2
perennial sunflower	Helianthus spp.	HELIA	7	0 - 20	0 - 2
phlox	Phlox spp.	PHLOX	7	0 - 20	0 - 2
prairie clovers	Dalea spp.	DALEA	7	0 - 20	0 - 2
pussytoes	Antennaria spp.	ANTEN	7	0 - 20	0 - 2
sandworts	Arenaria spp.	ARENA	7	0 - 20	0 - 2
scarlet globemallow	Sphaeralcea coccinea	SPCO	7	0 - 20	0 - 2
slimflower scurfpea	Psoralidium tenuiflorum	PSTE5	7	0 - 20	0 - 2
western ragweed	Ambrosia psilostachya	AMPS	7	0 - 20	0 - 2
western yarrow	Achillea millefolium	ACMI2	7	0 - 20	0 2
other perennial forbs (native)		2FP	7	0 - 50	0 - 5
SHRUBS AND HALF-SHRUBS			**8**	**0 - 50**	**0 - 5**
plains pricklypear	Opuntia polyacantha	OPPO	8	0 - 50	0 - 5
spreading buckwheat	Eriogonum effusum	EREF	8	0 - 50	0 - 5
yucca	Yucca glauca	YUGL	8	0 - 50	0 - 5
other shrubs and half-shrubs (native)		2SHRUB	8	0 - 50	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 Composition and Group Annual Production

Little Bluestem, Needleandthread, Western Wheatgrass (HCPC)

COMMON NAME/GROUP NAME	SCIENTIFIC NAME	SYMBOL	Annual Production (Normal Year)		
			Total:	1100	
			Group	lbs./acre	% Comp.
GRASSES AND GRASS-LIKES					
COOL-SEASON MID-GRASSES			**1**	**440 - 495**	**40 - 45**
needleandthread	Hesperostipa comata	HECO26	1	330 - 385	30 - 35
Indian ricegrass	Achnatherum hymenoides	ACHY	1	55 110	5 - 10
green needlegrass	Nassella viridula	NAVI4	1	55 110	5 - 10
bluebunch wheatgrass	Pseudoroegneria spicata	PSSP6	1	0 - 110	0 - 10
RHIZOMATOUS WHEATGRASSES:			**2**	**220 - 275**	**20 - 25**
western wheatgrass	Pascopyrum smithii	PASM	2	220 - 275	20 - 25
thickspike wheatgrass	Elymus lanceolatus	ELLA3	2	0 - 55	0 - 5
WARM-SEASON MID-TALL GRASSES			**3**	**110 - 220**	**10 - 20**
little bluestem	Schizachyrium scoparium	SCSC	3	110 - 165	10 - 15
sideoats grama	Bouteloua curtipendula	BOCU	3	0 - 55	0 - 5
WARM-SEASON SHORT GRASSES			**4**	**55 - 110**	**5 - 10**
blue grama	Bouteloua gracilis	BOGR2	4	55 - 110	5 - 10
MISCELLANEOUS GRASSES			**5**	**55 - 110**	**5 - 10**
plains muhly	Muhlenbergia cuspidata	MUCU3	5	0 - 55	0 - 5
prairie junegrass	Koeleria macrantha	KOMA	5	0 - 55	0 - 5
prairie sandreed	Calamovilfa longifolia	CALO	5	0 - 55	0 - 5
sand dropseed	Sporobolus cryptandrus	SPCR	5	0 - 55	0 - 5
threeawns	Aristida spp.	ARIST	5	0 - 22	0 - 2
other perennial grasses (native)		2GP	5	0 - 55	0 - 5
SEDGES			**6**	**0 - 55**	**0 - 5**
threadleaf sedge	Carex filifolia	CAFI	6	0 - 55	0 - 5
other sedges	Carex spp.	CAREX	6	0 - 55	0 - 5
FORBS			**7**	**165 - 220**	**15 - 20**
buckwheats	Eriogonum spp.	ERIOG	7	0 - 22	0 - 2
deathcamas	Zigadenus spp.	ZIGAD	7	0 - 22	0 - 2
dotted gayfeather	Liatris punctata	LIPU	7	0 - 22	0 - 2
fringed sagewort	Artemisia frigida	ARFR4	7	0 - 22	0 - 2
hairy goldaster	Heterotheca villosa	HEVI4	7	0 - 22	0 - 2
Lambert's crazyweed	Oxytropis lambertii	OXLA3	7	0 - 22	0 - 2
larkspurs	Delphinium spp.	DELPH	7	0 - 22	0 - 2
milkvetches	Astragalus spp.	ASTRA	7	0 - 22	0 - 2
penstemons	Penstemon spp.	PENST	7	0 - 22	0 - 2
perennial sunflower	Helianthus spp.	HELIA	7	0 - 22	0 - 2
phlox	Phlox spp.	PHLOX	7	0 - 22	0 - 2
prairie clovers	Dalea spp.	DALEA	7	0 - 22	0 - 2
pussytoes	Antennaria spp.	ANTEN	7	0 - 22	0 - 2
sandworts	Arenaria spp.	ARENA	7	0 - 22	0 - 2
scarlet globemallow	Sphaeralcea coccinea	SPCO	7	0 - 22	0 - 2
slimflower scurfpea	Psoralidium tenuiflorum	PSTE5	7	0 - 22	0 - 2
western ragweed	Ambrosia psilostachya	AMPS	7	0 - 22	0 - 2
western yarrow	Achillea millefolium	ACMI2	7	0 - 22	0 2
other perennial forbs (native)		2FP	7	0 - 55	0 - 5
SHRUBS AND HALF-SHRUBS			**8**	**0 - 55**	**0 - 5**
plains pricklypear	Opuntia polyacantha	OPPO	8	0 - 55	0 - 5
spreading buckwheat	Eriogonum effusum	EREF	8	0 - 55	0 - 5
yucca	Yucca glauca	YUGL	8	0 - 55	0 - 5
other shrubs and half-shrubs (native)		2SHRUB	8	0 - 55	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 table shown above has 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 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.

Little Bluestem, Needleandthread and Western Wheatgrass Community

This is the interpretive plant community and is considered to be the Historic Climax Plant Community (HCPC). This plant community evolved with grazing by large herbivores and is well suited for grazing by domestic livestock and can be found on areas that are grazed and where the grazed plants receive adequate periods of rest during the growing season in order to recover. Historically, fires likely occurred infrequently. The potential vegetation is about 85-90% grasses, 5-15% forbs, and 0-5% woody plants. Mid-grasses dominate the community. The principal grasses are little bluestem, needleandthread and western wheatgrass. Secondary grasses are bluebunch wheatgrass, Indian ricegrass and blue grama. Threadleaf sedge occurs as an understory. Dominant forbs are prairie clovers, dotted gayfeather, scarlet globemallow, fringed sagewort, hairy goldaster and slimflower scurfpea. Other plants in the community are yucca and spreading buckwheat.

The diversity of plant species allows for high dry tolerance and a sustainable plant community. Soil erosion and runoff is moderate due to texture and topography. Infiltration is moderate because of soil texture and topography. Areas having lost all vegetation, such as livestock and vehicle trails are subject to high erosion rates and extreme runoff.

The total annual production (lb./ac., air-dry weight) of this plant community during an average year is:

12-14"P.Z.

	LOW	AVG	HIGH
GRASS/GRASSLIKE	480	800	1120
FORB	105	175	245
SHRUB	15	25	35
TREE	0	0	0
TOTAL	600	1000	1400

15-17"P.Z.

	LOW	AVG	HIGH
GRASS/GRASSLIKE	520	875	1240
FORB	115	195	270
SHRUB	15	30	40
TREE	0	0	0
TOTAL	650	1100	1550

The following is the growth curve of this plant community expected during an average 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	20	25	25	15	5	0	0	0

(monthly percentages of total annual growth)

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

- Frequent and severe defoliation of mid-grasses will move this plant community to the *Blue Grama, Threeawn, Needleandthread Plant Community***.** The highly palatable plants are removed causing a decrease in diversity and productivity.

- No Use and No Fire will move this plant community to the *Increased Bare Ground, Excess Unincorporated Litter Plant Community***.** Lack of use causes the plants to become less vigorous, crowns of plants begin to die, and plant canopy begins to open up with more bare ground apparent.

Blue Grama, Threeawns, Needleandthread Plant Community

This plant community developed with frequent and severe defoliation during the growing season. The dominant grasses include blue grama, threeawn, and needleandthread. Little bluestem is still present as a secondary grass in the community. Significant forbs include phlox, scarlet globemallow, slimflower scurfpea, hairy goldaster and western ragweed. Other plants are fringed sagewort, yucca and pricklypear cactus. Compared to HCPC, little bluestem and western wheatgrass have decreased. Needleandthread, blue grama, threeawns and undesirable forbs have increased.

Management changes cannot easily move this plant community toward HCPC. Soil erosion is moderate. Infiltration is minimal because runoff is high. Areas that are devoid of vegetation are subject to extreme erosion and runoff.

In the 12 to 14 inch precipitation zone, the total annual production (air-dry weight) is about 700 pounds per acre during an average year, but it can range from about 400 pounds per acre in unfavorable years to about 1,000 pounds per acre in above average years.

In the 15 to 17 inch precipitation zone, the total annual production (air-dry weight) is about 800 pounds per acre during an average year, but it can range from about 500 pounds per acre in unfavorable years to about 1,100 pounds per acre in above average years.

The following is the growth curve of this plant community expected during an average 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	15	25	20	20	15	5	0	0	0

(monthly percentages of total annual growth)

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

- Frequent and severe defoliation of mid-grasses will move this plant community to the *Blue Grama Sod, Threadleaf Sedge, Threeawns, Annuals Plant Community*. Weedy species are starting to invade, and almost all mid-grasses are removed resulting in a decrease in palatable forage.

- Prescribed Grazing will shift this plant community towards the *Little Bluestem, Needleandthread, Western Wheatgrass Plant Community (HCPC)***.** The advantage of having this plant community at HCPC is increased desirable plant diversity, production and soil organic matter.

Increased Bare Ground, Excess Unincorporated Litter Plant Community

This plant community developed under many years with no defoliation and no fire. Plant litter accumulates in large amounts when this community first develops. Eventually, litter levels become high enough to crowd

out plants and more of the area becomes bare ground. Bunchgrasses develop dead centers and rhizomatous wheatgrasses form small communities because of a lack of stimulation by grazers. The dominant grasses/grasslikes include bluebunch wheatgrass, blue grama, sedges needleandthread and rhizomatous wheatgrass. Compared to the HCPC little bluestem, bluebunch wheatgrass, blue grama and perennial forbs have decreased and noxious weeds have started to invade.

Management changes can easily shift this plant community. Soil erosion is low when the surface litter is high, but increases when the litter disappears. Areas that are devoid of vegetation are subject to high erosion by wind and water.

In the 12 to 14 inch precipitation zone, the total annual production (air-dry weight) is about 800 pounds per acre during an average year, but it can range from about 500 pounds per acre in unfavorable years to about 1,100 pounds per acre in above average years.

In the 15 to 17 inch precipitation zone, the total annual production (air-dry weight) is about 900 pounds per acre during an average year, but it can range from about 600 pounds per acre in unfavorable years to about 1,200 pounds per acre in above average years.

The following is the growth curve of this plant community expected during an average 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	15	30	30	15	5	0	0	0

(monthly percentages of total annual growth)

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

- Prescribed Grazing will shift this plant community towards the *Little Bluestem, Needleandthread, Western Wheatgrass Plant Community (HCPC)***.** The advantage of having this Plant Community at HCPC is increased desirable plant diversity, production, plant vigor and soil organic matter.

Blue Grama Sod, Threadleaf Sedge, Threeawns, Annuals Plant Community

This plant community developed under frequent and severe defoliation during the growing season. The dominant grasses include blue grama, threadleaf sedge, threeawns, and annual grasses. Mid-grasses are still evident as remnant plants. The dominant forbs are western ragweed, phlox, broom snakeweed, buckwheat and green sagewort. Other plants are yucca, fringed sagewort and pricklypear cactus. Compared to HCPC, nearly all the mid-grasses are gone and weedy species have invaded the area. Undesirable grasses, forbs and other plants have increased.

Management changes cannot easily move this plant community toward HCPC. Soil erosion is severe. Infiltration is minimal because runoff is high. Areas that are devoid of vegetation are subject to extreme erosion and runoff.

In the 12 to 14 inch precipitation zone, the total annual production (air-dry weight) is about 500 pounds per acre during an average year, but it can range from about 400 pounds per acre in unfavorable years to about 600 pounds per acre in above average years.

In the 15 to 17 inch precipitation zone, the total annual production (air-dry weight) is about 550 pounds per acre during an average year, but it can range from about 450 pounds per acre in unfavorable years to about 650 pounds per acre in above average years.

The following is the growth curve of this plant community expected during an average 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	15	35	25	15	5	5	0	0	0

(monthly percentages of total annual growth)

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

- Long Term Frequent and Severe Defoliation of Mid-Grasses will move this plant community towards the *Bare Ground, Broken Blue Grama sod, Threeawns and Annuals Plant Community***.** The blue grama is the primary species and mid-grasses are no longer in the community resulting in a community that is low in diversity and production.

- Very Long Term Prescribed Grazing will move this plant community towards the *Blue Grama, Threeawns, Needleandthread Plant Community***.** Moving towards HCPC will increase production, desirable plant diversity and reduce soil erosion.

Bare Ground, Broken Blue Grama Sod, Threeawns and Annuals Plant Community

This plant community is caused by long-term frequent and severe defoliation during the growing season. The dominant plant is blue grama. Broom snakeweed, threadleaf sedge, yucca and cactus occur as secondary plants. Compared to HCPC, all desirable grasses and forbs are removed.

Management changes cannot easily move this plant community toward HCPC. Soil erosion is severe. Infiltration is minimal because runoff is high. Areas that are devoid of vegetation are subject to extreme erosion and runoff.

In the 12 to 14 inch precipitation zone, the total annual production (air-dry weight) is about 500 pounds per acre during an average year, but it can range from about 400 pounds per acre in unfavorable years to about 600 pounds per acre in above average years.

In the 15 to 17 inch precipitation zone, the total annual production (air-dry weight) is about 550 pounds per acre during an average year, but it can range from about 450 pounds per acre in unfavorable years to about 650 pounds per acre in above average years.

The following is the growth curve of this plant community expected during an average 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	20	40	30	10	0	0	0	0	0

(monthly percentages of total annual growth)

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

- Long Term Prescribed Grazing will move this plant community towards *Blue Grama sod, Threadleaf Sedge, Threeawns, Annuals Plant Community***.** Moving towards HCPC will increase production, desirable plant diversity and reduce soil erosion.

Ecological Site Interpretations

Animal Community – Wildlife Interpretations

Little Bluestem, Needleandthread, Western Wheatgrass Community: The predominance of grasses plus high forb diversity in this community favors large grazers such as pronghorn and elk. Suitable thermal and escape cover for mule deer is limited due to low shrub cover. White-tailed and black-tailed jackrabbit, badger, and coyote commonly use this community. This community also provides habitat for a wide array of smaller mammals, so diverse prey populations are available for raptors such as ferruginous and Swainson's hawks. Birds such as nighthawks will utilize this community for nesting.

Blue Grama, Threeawns, Needleandthread Plant Community: The reduction in taller grasses in this community results in decreased use by lark buntings and western meadowlarks. Use by long-billed curlew increases, provided there is standing water within ¼ mile. Killdeer, horned larks, and McCown's longspurs will also make significant use of this community. Pronghorn may forage in this community.

Increased Bare Ground, Excess Unincorporated Litter Plant Community: This community has low habitat value for most wildlife species. Horned larks may nest in this community. Jackrabbits are frequent users of this community.

Blue Grama Sod, Threadleaf Sedge, Threeawns, Annuals Plant Community: This community provides limited foraging for antelope and other grazers. Ground-nesting birds favoring sparse vegetation may use this community. Long-billed curlews will use this community if standing water is present within ¼ mile. Generally, this is not a target vegetative community for wildlife habitat management.

Bare Ground, Broken Blue Grama Sod, Threeawns, Annuals Plant Community: Sparse vegetation and greater amounts of bare ground provide suitable habitat for horned larks and McCown's longspurs. However, a lack of complex vegetation structure and residual cover makes this community poor habitat in general for most ground-nesting birds and big game species. Pronghorn may find limited forage in this community.

Animal Preferences (Quarterly - 1,2,3,4) for commonly occuring plants in MLRA 67 North

Common Name	Scientific Name	Symbol	Cattle	Sheep	Horses	Antelope	Deer	Elk
GRASSES/GRASSLIKES								
alkali bluegrass	Poa juncifolia	POJU	UDUD	NDNU	UDUD	UDUU	UDUU	DPDD
alkali cordgrass	Spartina gracilis	SPGR	UDPU	UPDU	UPDU	UUDU	UUDU	UDPU
alkali muhly	Muhlenbergia asperifolia	MUAS	UUDU	UUDU	UUDU	UUDU	UUDU	UUDU
alkali sacaton	Sporobolus airoides	SPAI	UDPU	UPDU	UPDU	UUDU	UUDU	UDPU
Baltic rush	Juncus balticus	JUBA	NNNN	NNNN	NNNN	NNNN	NNNN	NNNN
basin wildrye	Leymus cinereus	LECI4	DPDD	UPDU	DPDD	UDUU	UDUU	DPDD
big bluestem	Andropogon gerardii	ANGE	UDPD	UDDU	UDPD	UUDU	UUDU	UDPD
blowout grass	Redfieldia flexuosa	REFL	UUDU	UUDU	UUDU	UUDU	UUDU	UUDU
blue grama	Bouteloua gracilis	BOGR2	UDPU	UDPU	UDPU	UUDU	UUDU	UUDU
bluebunch wheatgrass	Pseudoroegneria spicata	PSSP6	DPDD	UPDD	DPDD	UDUU	UDUU	DPDD
bluegrasses	Poa spp.	POA	UPUU	UPND	UPUU	UPND	UPND	UPUU
bluejoint reedgrass	Calamagrostis canadensis	CACA4	UPDU	UDUU	UPDU	UDUU	UDUU	UPDU
buffalograss	Buchloe dactyloides	BUDA	UDPU	UDPU	UDPU	UUDU	UUDU	UUDU
bulrush	Scirpus spp.	SCIRP	NNNN	NNNN	NNNN	NNNN	NNNN	NNNN
Canada wildrye	Elymus canadensis	ELCA4	UDUU	NUNN	UDUU	NUNN	NUNN	UDUU
Fendler's threeawn	Aristida purpurea var. fendleriana	ARPUF	NNNN	NNNN	NNNN	NNNN	NNNN	NNNN
foxtail barley	Hordeum jubatum	HOJU	NDNN	NDNN	NDNN	NDNN	NDNN	NDNN
green needlegrass	Nassella viridula	NAVI4	DPPD	UPDU	DPPD	UDUU	UDUU	DPPD
hairy grama	Bouteloua hirsuta	BOHI2	UDPU	UDPU	UDPU	UUDU	UUDU	UUDU
Indian ricegrass	Achnatherum hymenoides	ACHY	DPPD	UPDU	DPPD	UDUU	UDUU	DPPD
Indiangrass	Sorghastrum nutans	SONU2	UDPD	UDDU	UDPD	UUDU	UUDU	UDPD
inland saltgrass	Distichlis spicata	DISP	NUUN	NUUN	NUUN	NUUN	NUUN	NUUN
little bluestem	Schizachyrium scoparium	SCSC	UDPU	UPDU	UPDU	UUDU	UUDU	UDPU
muhly	Muhlenbergia spp.	MUHLE	UUDU	UUDU	UUDU	UUDU	UUDU	UUDU
Nebraska sedge	Carex nebrascensis	CANE2	UDUD	UPND	UDUD	UPND	UPND	UDUD
needleandthread	Hesperostipa comata ssp. comata	HECOC8	DPDD	UPDU	DPDD	UDUU	UDUU	DPDD
northern reedgrass	Calamagrostis stricta ssp. inexpansa	CASTI3	UPDU	UDUU	UPDU	UDUU	UDUU	UPDU
Nuttall's alkaligrass	Puccinellia nuttalliana	PUNU2	DPUD	NPND	DPUD	UDUU	UDUU	DPPD
panicgrass	Dichanthelium wilcoxianum	DIWI5	UUDU	NUNN	UUDU	NUNN	NUNN	UUDU
plains bluegrass	Poa arida	POAR3	NPUN	NPUN	NPUN	NDUN	NDUN	NPUN
plains muhly	Muhlenbergia cuspidata	MUCU3	UUDU	UUDU	UUDU	UUDU	UUDU	UUDU
plains reedgrass	Calamagrostis montanensis	CAMO	UPDU	UDUU	UPDU	UDUU	UDUU	UPDU
prairie cordgrass	Spartina pectinata	SPPE	UDPD	UDDU	UDPD	UUDU	UUDU	UDPD
prairie junegrass	Koeleria macrantha	KOMA	UDUU	NDNU	UDUU	UDUU	UDUU	UDUU
prairie sandreed	Calamovilfa longifolia	CALO	UDPU	UDUU	UDDU	UUDU	UUDU	UUDU
reed canarygrass	Phalaris arundinacea	PHAR3	UDUU	NUNN	UDUU	NUNN	NUNN	UDUU
rushes	Juncus spp.	JUNCU	NNNN	NNNN	NNNN	NNNN	NNNN	NNNN
sand bluestem	Andropogon hallii	ANHA	UDPD	UDDU	UDPD	UUDU	UUDU	UDPD
sand dropseed	Sporobolus cryptandrus	SPCR	NUUN	NUUN	NUUN	NUUN	NUUN	NUUN
sand lovegrass	Eragrostis trichodes	ERTR3	UDPU	UUDU	UDDU	UUDU	UUDU	UDDU
sand paspalum	Paspalum setaceum	PASE5	NUUN	NUUN	NUUN	NUUN	NUUN	NUUN
Sandberg bluegrass	Poa secunda	POSE	NPUN	NPUN	NPUN	NDUN	NDUN	NPUN
sandhill muhly	Muhlenbergia pungens	MUPU2	UUDU	UUDU	UUDU	UUDU	UUDU	UUDU
sedge	Carex spp.	CAREX	UDUD	UPND	UDUD	UPND	UPND	UDUD
sideoats grama	Bouteloua curtipendula	BOCU	UDPU	UPDU	UPDU	UUDU	UUDU	UUDU
slender wheatgrass	Elymus trachycaulus ssp. trachycaulus	ELTRT	DPDD	UPDD	DPDD	UDUU	UDUU	DPDD
spikerush	Eleocharis spp.	ELEOC	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
switchgrass	Panicum virgatum	PAVI2	UDPD	UDDU	UDPD	UUDU	UUDU	UDPD
thickspike wheatgrass	Elymus lanceolatus ssp. lanceolatus	ELLAL	DPDD	UPDD	DPDD	UDUU	UDUU	DPDD
threadleaf sedge	Carex filifolia	CAFI	UDUD	UPND	UDUD	UPND	UPND	UDUD
threeawn	Aristida spp.	ARIST	NNNN	NNNN	NNNN	NNNN	NNNN	NNNN
western wheatgrass	Pascopyrum smithii	PASM	DPDD	UPDD	DPDD	UDUU	UDUU	DPDD
FORBS								
American licorice	Glycyrrhiza lepidota	GLLE3	NNNN	NUUN	NNNN	NUUN	NUUN	NUUN
American vetch	Vicia americana	VIAM	UPPU	UPPU	UPPU	UPPU	UPPU	UPPU
arrowgrass	Triglochin spp.	TRIGL	TTTT	TTTT	TTTT	TTTT	TTTT	TTTT
aster	Aster spp.	ASTER	NNNN	NNNN	NNNN	NNNN	NNNN	NNNN
biscuitroot	Lomatium spp.	LOMAT	UDUU	UDDU	UDUU	UDDU	UDDU	UDDU
blue-eyed grass	Sisyrinchium spp.	SISYR	UUDU	UUPU	UUDU	UUDU	UUDU	UUDU
breadroot	Pediomelum spp.	PEDIO2	NUUN	UDUU	NUUN	UDUU	UDUU	UDUU
broadleaf cattail	Typha latifolia	TYLA	UUDU	UUUU	UUDU	UUUU	UUDU	UUDU
buckwheat	Eriogonum spp.	ERIOG	NNNN	UUUU	NNNN	UUUU	UUUU	UUUU
bush morningglory	Ipomoea leptophylla	IPLE	UUUU	UUUU	NNNN	UUUU	UUUU	UUUU
cinquefoil	Potentilla spp.	POTEN	NNNN	UUUU	NNNN	UUUU	UUUU	UUUU
cudweed sagewort	Artemisia ludoviciana	ARLU	UUUU	UUDU	UUUU	UUDU	UUDU	UUDU
curlycup gumweed	Grindelia squarrosa	GRSQ	NNNN	NNNN	NNNN	NNNN	NNNN	NNNN
deathcamas	Zigadenus venenosus	ZIVE	TTTT	TTTT	TTTT	TTTT	TTTT	TTTT
dotted gayfeather	Liatris punctata	LIPU	UPPU	UPPU	UPPU	UPPU	UPPU	UPPU
evening primroses	Oenothera spp.	OENOT	NNNN	NNNN	NNNN	NNNN	NNNN	NNNN
false boneset	Brickellia eupatorioides	BREU	NDUN	NDUN	NNNN	NDUN	NDUN	NDUN
fringed sagewort	Artemisia frigida	ARFR4	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
goldenrod	Solidago spp.	SOLID	NUNN	NUNN	NNNN	NUNN	NUNN	NUNN

Animal Preferences (Quarterly - 1,2,3,4) for commonly occuring plants in MLRA 67 North

green sagewort	Artemisia campestris	ARCA12	NNNN	NUUN	NNNN	NUUN	NUUN	NNNN
greenthread	Thelesperma spp.	THELE	NNNN	NNNN	NNNN	NNNN	NNNN	NNNN
groundsel	Senecio spp.	SENEC	NNNN	NNNN	NNNN	NNNN	NNNN	NNNN
hairy goldaster	Heterotheca villosa	HEVI4	NNNN	NNNN	NNNN	NNNN	NNNN	NNNN
heath aster	Symphyotrichum ericoides	SYER	NNNN	NNNN	NNNN	NNNN	NNNN	NNNN
iris	Iris spp.	IRIS	NUUN	NUUN	NNNN	NUUN	NUUN	NUUN
ironweed	Vernonia spp.	VERNO	NNNN	NNNN	NNNN	NNNN	NNNN	NNNN
Lambert crazyweed	Oxytropis lambertii	OXLA3	TTTT	TTTT	TTTT	TTTT	TTTT	TTTT
larkspur	Delphinium spp.	DELPH	TTTT	TTTT	TTTT	TTTT	TTTT	TTTT
lemon scurfpea	Psoralidium lanceolatum	PSLA3	NNNN	NUUN	NNNN	NUUN	NUUN	NUUN
Maximilian sunflower	Helianthus maximiliani	HEMA2	UDPU	UDPU	UDPU	UDPU	UDPU	UDPU
milkvetch	Astragalus spp.	ASTRA	UDUU	UDUU	UDUU	UDUU	UDUU	UDUU
nailwort	Paronychia spp.	PARON	NNNN	NNNN	NNNN	NNNN	NNNN	NNNN
Pennsylvania smartweed	Polygonum pensylvanicum	POPE2	NNNN	NNNN	NNNN	NNNN	NNNN	NNNN
penstemons	Penstemon spp.	PENST	UPPU	UPPU	UPPU	UPPU	UPPU	UPPU
perennial sunflowers	Helianthus spp.	HELIA3	UPPU	UPPU	UPPU	UPPU	UPPU	UPPU
phlox	Phlox spp.	PHLOX	NNNN	NNNN	NNNN	NNNN	NNNN	NNNN
poison hemlock	Conium maculatum	COMA2	TTTT	TTTT	TTTT	TTTT	TTTT	TTTT
prairie clovers	Dalea spp.	DALEA	UPPU	UPPU	UPPU	UPPU	UPPU	UPPU
prairie coneflower	Ratibida columnifera	RACO3	UPPU	UPPU	UPPU	UPPU	UPPU	UPPU
purple prairie clover	Dalea purpurea	DAPU5	UPPU	UPPU	UPPU	UPPU	UPPU	UPPU
Pursh seepweed	Suaeda calceoliformis	SUCA2	NNNN	NNNN	NNNN	NNNN	NNNN	NNNN
pussytoes	Antennaria spp.	ANTEN	NNNN	NNNN	NNNN	NNNN	NNNN	NNNN
rush skeletonplant	Lygodesmia juncea	LYJU	NNNN	NNNN	NNNN	NNNN	NNNN	NNNN
sandwort	Arenaria spp.	ARENA	NNNN	NNNN	NNNN	NNNN	NNNN	NNNN
scarlet gaura	Gaura coccinea	GACO5	NNNN	NUUN	NNNN	NUUN	NUUN	NNNN
scarlet globemallow	Sphaeralcea coccinea	SPCO	UUDU	UDDU	UUDU	UPPU	UDDD	UDDD
scurfpea	Psoralidium spp.	PSORA2	NNNN	NUUN	NNNN	NUUN	NUUN	NUUN
showy peavine	Lathyrus polymorphus	LAPO2	UPPU	UPPU	UPPU	UPPU	UPPU	UPPU
silky prairie clover	Dalea villosa	DAVI	UPPU	UPPU	UPPU	UPPU	UPPU	UPPU
slimflower scurfpea	Psoralidium tenuiflorum	PSTE5	NNNN	NUUN	NNNN	NUUN	NUUN	NUUN
spiderworts	Tradescantia spp.	TRADE	NNNN	NNNN	NNNN	NNNN	NNNN	NNNN
stiff sunflower	Helianthus pauciflorus	HEPA19	UDPU	UDPU	UDPU	UDPU	UDPU	UDPU
swamp smartweed	Polygonum hydropiperoides	POHY2	NNNN	NNNN	NNNN	NNNN	NNNN	NNNN
tenpetal blazingstar	Mentzelia decapetala	MEDE2	NNNN	NNNN	NNNN	NNNN	NNNN	NNNN
veiny dock	Rumex venosus	RUVE2	NNNN	NUUN	NNNN	NUUN	NUUN	NUUN
water hemlock	Cicuta spp.	CICUT	TTTT	TTTT	TTTT	TTTT	TTTT	TTTT
western ragweed	Ambrosia psilostachya	AMPS	NNNN	NNNN	NNNN	NNNN	NNNN	NNNN
western yarrow	Achillea millefolium	ACMI2	NUUN	NUUN	NNNN	NUUN	NUUN	NUUN
white prairie clover	Dalea candida	DACA7	UPPU	UPPU	UPPU	UPPU	UPPU	UPPU
whiteflower gilia	Ipomopsis longiflora ssp. longiflora	IPLOL	NUUN	NUUN	NNNN	NUUN	NUUN	NUUN
wild onion	Allium textile	ALTE	UDUU	UDUU	UDUU	UDUU	UDUU	UDUU
wild strawberry	Fragaria virginiana	FRVI	NNNN	NUUN	NNNN	NUUN	NUUN	NUUN
woollywhite hymenopappus	Hymenopappus tenuifolius	HYTE2	NNNN	NNNN	NNNN	NNNN	NNNN	NNNN
TREES, SHRUBS, AND HALF-SHRUBS								
antelope bitterbrush	Purshia tridentata	PUTR2	PDDD	PDDD	DDUD	PDDP	PDPP	PDDP
Arkansas rose	Rosa arkansana	ROAR3	UDDU	UDDU	NUUN	UDDU	UDDU	UDDU
big sagebrush	Artemisia tridentata	ARTR2	UNUU	DUUD	UNNU	PPPP	PUDP	DUUU
boxelder	Acer negundo	ACNE2	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
brittle cactus	Opuntia fragilis	OPFR	NNNN	NNNN	NNNN	NNNN	NNNN	NNNN
broom snakeweed	Gutierrezia sarothrae	GUSA2	NNNN	UUUU	NNNN	UUUU	UUUU	UUUU
fourwing saltbush	Atriplex canescens	ATCA2	PDDP	PDDP	PDDP	PDDP	PDDP	PDDP
Gardner's saltbush	Atriplex gardneri	ATGA	PDDP	PDDP	DUUD	PDDP	PDDP	PDDP
greasewood (Toxic in large amounts)	Sarcobatus vermiculatus	SAVE4	DUUD	DUUD	DUUD	DUUD	DUUD	DUUD
green ash	Fraxinus pennsylvanica	FRPE	UUUU	UUUU	UUUU	UDDU	UDDU	UUUU
green rabbitbrush	Chrysothamnus viscidiflorus	CHVI8	DUUD	DUUD	UNNU	PUDD	PUDD	DUUD
leadplant	Amorpha canescens	AMCA6	UPDU	UPDU	UDDU	UPDU	UPDU	UPDU
plains cottonwood	Populus deltoides ssp. monilifera	PODEM	DUDD	DUDD	DUDD	DUDD	DUDD	DUDD
plains pricklypear	Opuntia polyacantha	OPPO	NNNN	NNNN	NNNN	NNNN	NNNN	NNNN
ponderosa pine	Pinus ponderosa var. scopulorum	PIPOS	UTTU	UNNU	UNNU	UNNU	UNNU	UNNU
Rocky Mountain juniper	Juniperus scopulorum	JUSC2	UNNU	UNNU	UNNU	UNNU	DUUD	UNNU
rose	Rosa spp.	ROSA5	UDDU	UDDU	NUUN	UDDU	UDDU	UDDU
rubber rabbitbrush	Ericameria nauseosa	ERNA10	UUUU	DUUD	UUUU	UDDU	DUUD	DUUU
sand sagebrush	Artemisia filifolia	ARFI2	UNNU	UNNU	UNNU	UNNU	UNNU	UNNU
silver buffaloberry	Shepherdia argentea	SHAR	DUUU	DUUU	UUUU	UUUU	PUDP	DUUU
silver sagebrush	Artemisia cana	ARCA13	DUUD	DUUD	UNNU	PPPP	PDDP	DUUD
skunkbush sumac	Rhus trilobata	RHTR	DUUD	DUUD	UUUU	DUUD	DUUD	DUUD
spreading buckwheat	Eriogonum effusum	EREF	UUUU	UUUU	UUUU	UUUU	UUUU	UUUU
true mountainmahogany	Cercocarpus montanus	CEMO2	DDDD	PDDD	DDDD	UNNU	PDDP	PDDD
western sandcherry	Prunus pumila var. besseyi	PRPUB	DUUD	DUUD	DUUD	DUUD	PUDP	PUUP
western snowberry	Symphoricarpos occidentalis	SYOC	UUUU	UUUU	UUUU	UUUU	DUDD	DUUU
willows	Salix spp.	SALIX	PUDP	PUDP	DUUD	UUUU	PUDP	PUDP
winterfat	Krascheninnikovia lanata	KRLA2	PPPP	PPPP	PPPP	PPPP	PPPP	PPPP
yucca	Yucca glauca	YUGL	DUUD	DUUD	UUUU	DUUD	DUUD	DUUD

Animal Community – Grazing Interpretations

The following tables list suggested initial stocking rates for cattle under continuous grazing (year long grazing or growing season long grazing) under normal growing conditions; however, *continuous grazing is not typically recommended.* 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 the following stocking rate 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.

Plant Community 12-14" Precipitation	**Production (lbs./acre)**	**Carrying Capacity (AUM/acre)**
Little Bluestem, Needleandthread, Western Wheatgrass (HCPC)	1000	0.32
Blue Grama, Threeawns, Needleandthread	700	0.22
Blue Grama Sod, Threadleaf Sedge, Threeawns, Annuals	500	0.16
Bare Ground, Broken Blue Grama Sod, Threeawns & Annuals	500	0.15
Increased Bare Ground, Excess Unincorporated Litter	800	0.25

Plant Community 15-17" Precipitation	**Production (lbs./acre)**	**Carrying Capacity (AUM/acre)**
Little Bluestem, Needleandthread, Western Wheatgrass (HCPC)	1100	0.35
Blue Grama, Threeawns, Needleandthread	800	0.25
Blue Grama Sod, Threadleaf Sedge, Threeawns, Annuals	550	0.17
Bare Ground, Broken Blue Grama Sod, Threeawns & Annuals	550	0.16
Increased Bare Ground, Excess Unincorporated Litter	900	0.29

Grazing by domestic livestock is one of the major income-producing industries in the area. Rangelands in this area provide yearlong forage under prescribed grazing for cattle, sheep, horses and other herbivores. During the dormant period, livestock may need supplementation based on reliable forage analysis.

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 moderately slow to moderate. Runoff potential for this site varies from moderate to moderately 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. 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, hiking, photography, bird watching and other opportunities. The wide varieties of plants that 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
(R067XY122WY) – Loamy 12-17 ” P.Z.

Similar Sites
(R067XY112WY) – Gravelly 12-17” P.Z. is less productive

Inventory Data References (narrative)
Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range trained personnel was also used.

Inventory Data References

Data Source	Number of Records	Sample Period	State	County
SCS-RANGE-417	110	1963 -1987	WY	Platte & others

State Correlation
This site has been correlated with Wyoming, Colorado, and Nebraska.

Type Locality

Field Offices
Wyoming: Cheyenne, Douglas, Lusk, Torrington, Wheatland
Nebraska: Bridgeport, Harrisburg, Kimball, Oshkosh, Scottsbluff, Sidney
Colorado: Greeley, Sterling

Relationship to Other Established Classifications

Other References
Other sources used as references include: High Plains Regional Climate Center, USDA NRCS Water and Climate Center, USDA NRCS National Range and Pasture Handbook, and USDA NRCS Soil Surveys from various counties.

Site Description Approval

State Range Management Specialist	Date
State Range Management Specialist	Date
State Range Management Specialist	Date