

United States Department of Agriculture Natural Resources Conservation Service

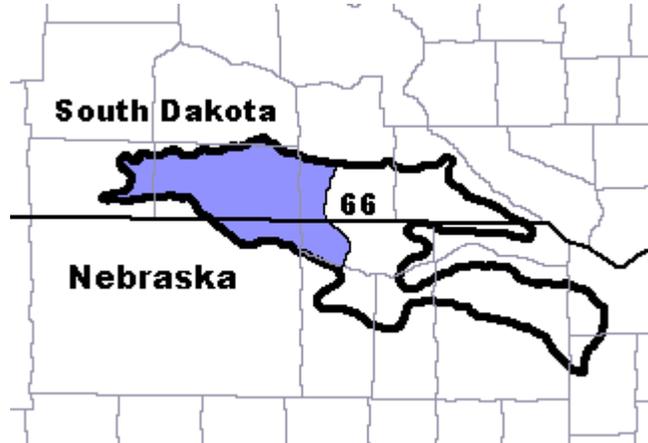
Ecological Site Description

Site Type: Rangeland

Site Name: Loamy 18-22" P.Z.

Site ID: R066XY036NE

Major Land Resource Area (MLRA):
66 – Dakota - Nebraska (NE) Eroded
Tableland



Physiographic Features

This site occurs on gently undulating to moderately steep rolling plains and low hills.

Landform: plain, terrace, hill

Aspect: N/A

	<u>Minimum</u>	<u>Maximum</u>
Elevation (feet):	1,900	3,000
Slope (percent):	0	20
Water Table Depth (inches):	80	80
Flooding:		
Frequency:	None	None
Duration:	None	None
Ponding:		
Depth (inches):	None	None
Frequency:	None	None
Duration:	None	None
Runoff Class:	Negligible	Medium

Climatic Features

MLRA 66 is considered to have a continental climate – cold winters and hot summers, low humidity, light rainfall, and much sunshine. Extremes in temperature may also abound. The climate is the result of this MLRA's location near the geographic center of North America. There are few natural barriers on the Northern Great Plains and the winds move freely across the plains and account for rapid changes in temperature.

Annual precipitation ranges from 18 to 22 inches per year. The normal average annual temperature is about 47°F. January is the coldest month with average temperatures ranging from about 20°F (Valentine, NE), to about 23°F (Ainsworth, NE). July is the warmest month with temperatures averaging from about 73°F (Harrington, South Dakota (SD)), to about 75°F (Ainsworth, NE). The range of normal average monthly temperatures between the coldest and warmest months is about 53°F. This large annual range attests to the continental nature of this area's climate. Hourly winds average about 10 miles per hour (mph) annually, ranging from about 11 mph during the spring to about 9 mph during the summer. Daytime winds are generally stronger than nighttime and occasional strong storms may bring brief periods of high winds with gusts to more than 50 mph.

Growth of native cool-season plants begins mid- to late March and continues to late June. Native warm-season plants begin growth in early May and continue to late August. Greenup of cool-season plants may occur in September and October when adequate soil moisture is present.

	<u>Minimum</u>	<u>Maximum</u>
Frost-free period (days):	127	154
Freeze-free period (days):	144	172
Mean Annual Precipitation (inches):	18	22

Average Monthly Precipitation (inches) and Temperature (°F):

	Precip. Min.	Precip. Max	Temp. Min.	Temp. Max.
January	0.28	0.42	8.2	33.6
February	0.48	0.63	13.5	38.9
March	0.92	1.23	21.3	46.9
April	1.94	2.26	31.7	60.6
May	3.08	3.38	42.8	71.6
June	3.10	3.67	52.6	81.3
July	2.86	3.17	58.5	87.8
August	2.33	2.65	56.2	86.1
September	1.54	2.30	45.9	76.8
October	1.03	1.34	33.7	64.9
November	0.55	0.82	20.8	47.6
December	0.32	0.45	11.2	37.1

Climate Stations		Period	
Station ID	Location or Name	From	To
NE0050	Ainsworth	1948	2003
SD3574	Harrington	1960	2003
NE8760	Valentine WSO AP	1948	2003

For other climate stations that may be more representative, refer to <http://www.wcc.nrcs.usda.gov>.

Influencing Water Features

No significant water features influence this site.

Representative Soil Features

The features common to soils of this site are the loam to fine sandy loam textured surface layers and slopes of 0 to 20 percent. These well-drained soils formed primarily in eolian deposits. The surface layer is 6 to 17 inches thick. The texture of the soil subsurface generally ranges from clay loam to fine sandy loam. This site should show slight to no evidence of rills, wind scoured areas, or pedestalled plants. Water flow paths are broken should not be distinguishable and litter should fall and mainly remain in place. The soil surface is stable and intact. Subsurface soil layers are not restrictive to water movement and root penetration.

These soils are mainly susceptible to water erosion. The hazard of water erosion increases on slopes greater than about 10 percent.

More information can be found in the various soil survey reports. Contact the local United States Department of Agriculture (USDA) Service Center for soil survey reports that include more detail specific to your location.

Parent Material Kind: eolian deposits
Parent Material Origin:
Surface Texture: loamy, fine sandy loam, silt loam
Surface Texture Modifier: none
Subsurface Texture Group: loamy
Surface Fragments ≤3" (% Cover): 0
Surface Fragments >3" (%Cover): 0
Subsurface Fragments ≤3" (% Volume): 0-55
Subsurface Fragments >3" (% Volume): 0-10

	<u>Minimum</u>	<u>Maximum</u>
Drainage Class:	well	well
Permeability Class:	moderate	rapid
Depth (inches):	40	80
Electrical Conductivity (mmhos/cm)*:	0	2
Sodium Absorption Ratio*:	0	5
Soil Reaction (1:1 Water)*:	5.1	8.4
Soil Reaction (0.1M CaCl₂)*:	NA	NA
Available Water Capacity (inches)*:	6	7
Calcium Carbonate Equivalent (percent)*:	0	10

*These attributes represent 0-40 inches in depth or to the first restrictive layer.

Plant Communities

Ecological Dynamics of the Site

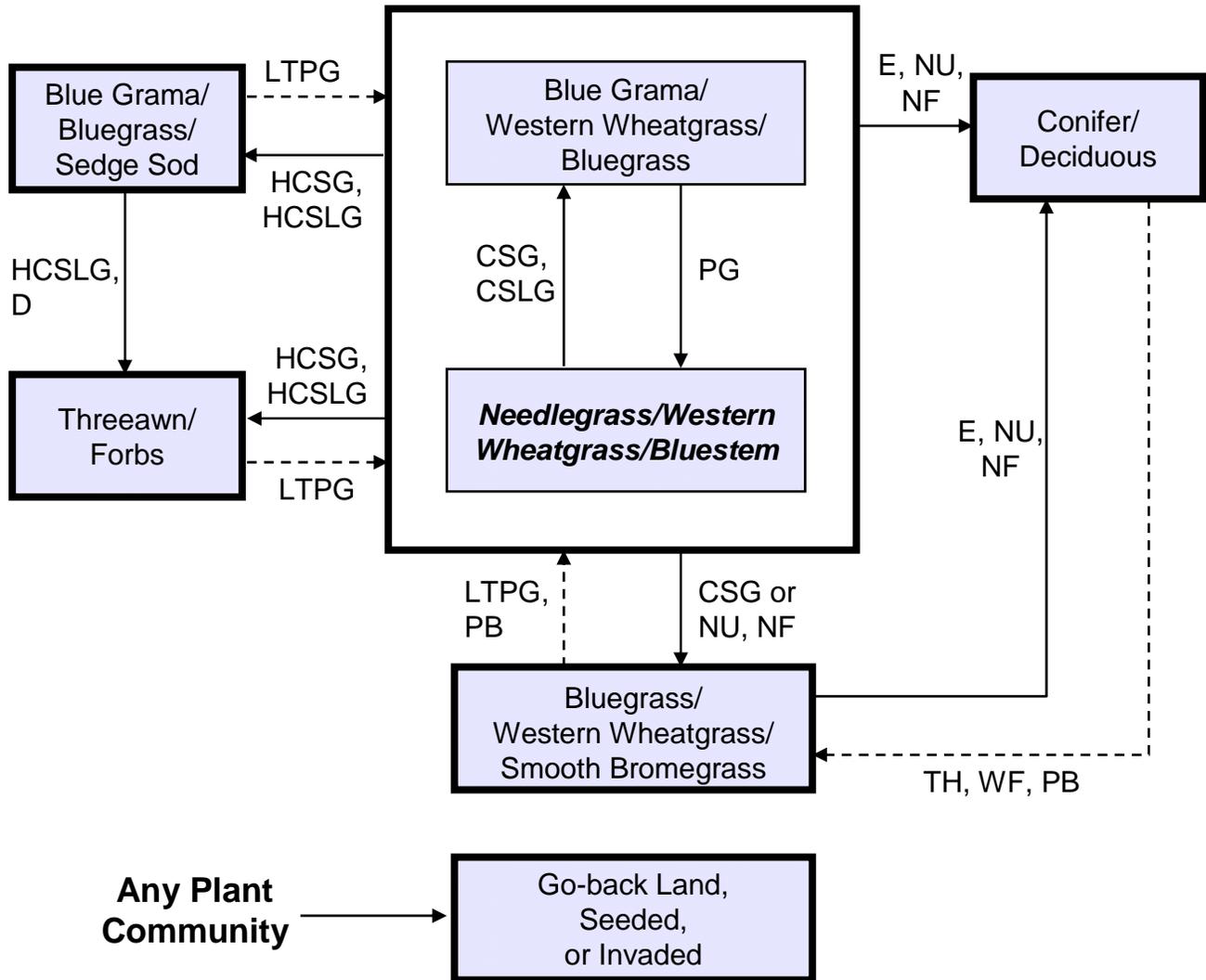
This plant community developed under Northern Great Plains climatic conditions, and included natural influence of large herbivores and occasional fire. Changes will occur in the plant communities due to management actions and/or climatic conditions.

Natural fire played a significant role in the maintenance of this site by limiting conifer establishment. The recent control of fire and the increased seed source from shelterbelts results in occasional encroachment by *Juniperus* species and/or ponderosa pine.

The plant community upon which interpretations are primarily based is the Needlegrass/Western Wheatgrass/Bluestem Plant Community. This plant community has been determined by study of rangeland relic areas, areas protected from excessive disturbance, and areas managed under long-term rotational grazing regimes. Trends in plant community dynamics ranging from heavily grazed to lightly grazed areas, seasonal use pastures, and historical accounts also have been used.

The following is a diagram that illustrates the common plant communities that can occur on the site and the transition pathways between communities. The ecological processes will be discussed in more detail in the plant community descriptions following the diagram.

Plant Communities and Transitional Pathways



CSG – Continuous seasonal grazing; **CSLG** – Continuous season-long grazing; **D** – Defoliation (rodents, insects, etc.); **E** – Encroachment or escaped; **HCSG** – Heavy continuous seasonal grazing; **HCSLG** – Heavy continuous season-long grazing; **LTPG** – Long-term prescribed grazing; **NF** – No fire; **NU** – Non-use; **PB** – Prescribed burning; **PG** – Prescribed grazing; **TH** – Timber harvest; **WF** – Wildfire; - - - - - Denotes long term or use of accelerating practices.

Plant Community Composition and Group Annual Production

COMMON/GROUP NAME	SCIENTIFIC NAME	SYMBOL	Needlegrass/Western Wheatgrass/Bluestem		
			Group	Ibs./acre	% Comp
GRASSES & GRASS-LIKES				2080 - 2340	80 - 90
NEEDLEGRASSES			1	520 - 780	20 - 30
green needlegrass	Nassella viridula	NAVI4	1	130 - 650	5 - 25
needleandthread	Hesperostipa comata ssp. comata	HECOC8	1	130 - 520	5 - 20
porcupine grass	Hesperostipa spartea	HESP11	1	0 - 130	0 - 5
RHIZOMATOUS WHEATGRASS			2	260 - 650	10 - 25
western wheatgrass	Pascopyrum smithii	PASM	2	260 - 650	10 - 25
MID WARM-SEASON GRASSES			3	130 - 390	5 - 15
little bluestem	Schizachyrium scoparium	SCSC	3	52 - 260	2 - 10
sideoats grama	Bouteloua curtipendula	BOCU	3	52 - 208	2 - 8
plains muhly	Muhlenbergia cuspidata	MUCU3	3	0 - 130	0 - 5
prairie dropseed	Sporobolus heterolepis	SPHE	3	0 - 130	0 - 5
TALL WARM-SEASON GRASSES			4	52 - 260	2 - 10
big bluestem	Andropogon gerardii	ANGE	4	52 - 260	2 - 10
switchgrass	Panicum virgatum	PAVI2	4	0 - 130	0 - 5
Indiangrass	Sorghastrum nutans	SONU2	4	0 - 130	0 - 5
SHORT WARM-SEASON GRASSES			5	52 - 260	2 - 10
blue grama	Bouteloua gracilis	BOGR2	5	52 - 260	2 - 10
buffalograss	Bouteloua dactyloides	BODA2	5	0 - 130	0 - 5
threeawn	Aristida spp.	ARIST	5	0 - 78	0 - 3
OTHER NATIVE GRASSES			6	26 - 130	1 - 5
prairie junegrass	Koeleria macrantha	KOMA	6	26 - 130	1 - 5
Scribner panicum	Dichanthelium oligosanthes var. scribnerianum	DIOLS	6	0 - 52	0 - 2
sand dropseed	Sporobolus cryptandrus	SPCR	6	0 - 26	0 - 1
other perennial grasses		2GP	6	0 - 130	0 - 5
GRASS-LIKES			7	52 - 260	2 - 10
threadleaf sedge	Carex filifolia	CAFI	7	52 - 260	2 - 10
other grass-likes		2GL	7	0 - 130	0 - 5
FORBS			9	130 - 260	5 - 10
blue verbena	Verbena hastata	VEHA2	9	0 - 26	0 - 1
blue-eyed grass	Sisyrinchium spp.	SISYR	9	0 - 26	0 - 1
bush morningglory	Ipomoea leptophylla	IPLE	9	0 - 52	0 - 2
catclaw sensitive briar	Mimosa nuttallii	MINU6	9	26 - 52	1 - 2
cudweed sagewort	Artemisia ludoviciana	ARLU	9	26 - 78	1 - 3
cutleaf ironplant	Machaeranthera pinnatifida	MAPI	9	0 - 26	0 - 1
dotted gayfeather	Liatris punctata	LIPU	9	26 - 52	1 - 2
false boneset	Brickellia eupatorioides	BREU	9	26 - 52	1 - 2
false gromwell	Onosmodium molle	ONMO	9	26 - 52	1 - 2
goldenrod	Solidago spp.	SOLID	9	26 - 78	1 - 3
green sagewort	Artemisia dracunculus	ARDR4	9	0 - 52	0 - 2
heath aster	Symphotrichum ericoides	SYER	9	0 - 52	0 - 2
penstemon	Penstemon spp.	PENST	9	0 - 26	0 - 1
prairie coneflower	Ratibida columnifera	RACO3	9	26 - 52	1 - 2
purple coneflower	Echinacea angustifolia	ECAN2	9	26 - 52	1 - 2
pussytoes	Antennaria spp.	ANTEN	9	0 - 26	0 - 1
rush skeletonweed	Lygodesmia juncea	LYJU	9	0 - 26	0 - 1
scarlet gaura	Gaura coccinea	GACO5	9	0 - 26	0 - 1
scarlet globemallow	Sphaeralcea coccinea	SPCO	9	26 - 52	1 - 2
scurfpea	Psoraleidum spp.	PSORA2	9	26 - 78	1 - 3
stiff sunflower	Helianthus pauciflorus	HEPA19	9	26 - 52	1 - 2
western ragweed	Ambrosia psilostachya	AMPS	9	26 - 52	1 - 2
native forbs		2FN	9	0 - 78	0 - 3
SHRUBS			10	130 - 260	5 - 10
fringed sagewort	Artemisia frigida	ARFR4	10	26 - 78	1 - 3
leadplant	Amorpha canescens	AMCA6	10	26 - 130	1 - 5
plains pricklypear	Opuntia polyacantha	OPPO	10	0 - 52	0 - 2
rose	Rosa spp.	ROSA5	10	26 - 78	1 - 3
western snowberry	Symphoricarpos occidentalis	SYOC	10	26 - 78	1 - 3
other shrubs		2SHRUB	10	0 - 52	0 - 2

Annual Production Ibs./acre	LOW	RV	HIGH
GRASSES & GRASS-LIKES	1550 -	2210	-3050
FORBS	125 -	195	-275
SHRUBS	125 -	195	-275
TOTAL	1800 -	2600	-3600

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. RV = Representative value.

Plant Community Composition and Group Annual Production

COMMON/GROUP NAME	SYMBOL	Needlegrass/Western Wheatgrass/Bluestem			Blue Grama/Western Wheatgrass/Bluegrass			Blue Grama/Bluegrass/Sedge Sod			Bluegrass/Western Wheatgrass/Smooth Brome		
		Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp
GRASSES & GRASS-LIKES			2080 - 2340	80 - 90		1500 - 1800	75 - 90		1125 - 1350	75 - 90		1750 - 2250	70 - 90
NEEDLEGRASSES		1	520 - 780	20 - 30	1	100 - 300	5 - 15	1	0 - 45	0 - 3	1		
green needlegrass	NAV14	1	130 - 650	5 - 25	1	20 - 160	1 - 8				1	0 - 125	0 - 5
needleandthread	HECO8	1	130 - 520	5 - 20	1	100 - 300	5 - 15	1	0 - 45	0 - 3	1	25 - 200	1 - 8
porcupine grass	HESP11	1	0 - 130	0 - 5	1	0 - 40	0 - 2						
RHIZOMATOUS WHEATGRASSES		2	260 - 650	10 - 25	2	300 - 600	15 - 30	2	0 - 75	0 - 5	2	125 - 500	5 - 20
western wheatgrass	PASM	2	260 - 650	10 - 25	2	300 - 600	15 - 30	2	0 - 75	0 - 5	2	125 - 500	5 - 20
MID WARM-SEASON GRASSES		3	130 - 390	5 - 15	3	20 - 100	1 - 5	3			3	0 - 125	0 - 5
little bluestem	SCSC	3	52 - 260	2 - 10	3	0 - 60	0 - 3						
sideoats grama	BOCU3	3	52 - 208	2 - 8	3	20 - 60	1 - 3				3	0 - 125	0 - 5
plains muhly	MUCU3	3	0 - 130	0 - 5	3	0 - 20	0 - 1						
prairie dropseed	SPHE	3	0 - 130	0 - 5									
TALL WARM-SEASON GRASSES		4	52 - 260	2 - 10	4	0 - 40	0 - 2	4			4		
big bluestem	ANGE	4	52 - 260	2 - 10	4	0 - 40	0 - 2						
switchgrass	PAVI2	4	0 - 130	0 - 5	4	0 - 20	0 - 1						
Indiangrass	SONU2	4	0 - 130	0 - 5									
SHORT WARM-SEASON GRASSES		5	52 - 260	2 - 10	5	100 - 400	5 - 20	5	300 - 600	20 - 40	5	50 - 175	2 - 7
blue grama	BOGR2	5	52 - 260	2 - 10	5	100 - 300	5 - 15	5	225 - 525	15 - 35	5	25 - 125	1 - 5
buffalograss	BODA2	5	0 - 130	0 - 5	5	40 - 200	2 - 10	5	75 - 225	5 - 15	5	0 - 75	0 - 3
threeawn	ARIST	5	0 - 78	0 - 3	5	20 - 100	1 - 5	5	30 - 120	2 - 8	5	25 - 125	1 - 5
OTHER NATIVE GRASSES		6	26 - 130	1 - 5	6	40 - 160	2 - 8	6	15 - 105	1 - 7	6	50 - 200	2 - 8
prairie junegrass	KOMA	6	26 - 130	1 - 5	6	20 - 60	1 - 3	6			6	0 - 50	0 - 2
Scribner panicum	DIOLS	6	0 - 52	0 - 2	6	20 - 60	1 - 3	6	0 - 30	0 - 2	6	0 - 25	0 - 1
sand dropseed	SPCR	6	0 - 26	0 - 1	6	20 - 100	1 - 5	6	15 - 105	1 - 7	6	25 - 125	1 - 5
other perennial grasses	2GP	6	0 - 130	0 - 5	6	0 - 100	0 - 5	6	0 - 45	0 - 3	6	0 - 125	0 - 5
GRASS-LIKES		7	52 - 260	2 - 10	7	60 - 240	3 - 12	7	30 - 180	2 - 12	7	25 - 250	1 - 10
threadleaf sedge	CAFI	7	52 - 260	2 - 10	7	60 - 240	3 - 12	7	30 - 180	2 - 12	7	25 - 200	1 - 8
other grass-likes	2GL	7	0 - 130	0 - 5	7	0 - 100	0 - 5	7	0 - 30	0 - 2	7	0 - 200	0 - 8
NON-NATIVE GRASSES		8			8	100 - 260	5 - 13	8	225 - 450	15 - 30	8	500 - 1250	20 - 50
bluegrass	POA				8	100 - 200	5 - 10	8	225 - 450	15 - 30	8	375 - 875	15 - 35
cheatgrass	BRTE				8	0 - 100	0 - 5	8	15 - 120	1 - 8	8	25 - 250	1 - 10
Japanese brome	BRJA				8	0 - 100	0 - 5	8	15 - 120	1 - 8	8	25 - 250	1 - 10
smooth brome	BRIN2				8	20 - 160	1 - 8	8	0 - 75	0 - 5	8	125 - 750	5 - 30
FORBS		9	130 - 260	5 - 10	9	100 - 200	5 - 10	9	75 - 150	5 - 10	9	125 - 250	5 - 10
blue verbena	VEHA2	9	0 - 26	0 - 1	9	0 - 60	0 - 3	9	0 - 60	0 - 4	9	0 - 75	0 - 3
blue-eyed grass	SISYR	9	0 - 26	0 - 1									
bush morningglory	IPL	9	0 - 52	0 - 2	9	0 - 40	0 - 2				9	0 - 25	0 - 1
catclaw sensitive briar	MINU6	9	26 - 52	1 - 2									
cutweed sawwort	ARLU	9	26 - 78	1 - 3	9	20 - 100	1 - 5	9	15 - 75	1 - 5	9	25 - 125	1 - 5
curlycup gumweed	GRSQ				9	20 - 60	1 - 3	9	15 - 90	1 - 6	9	25 - 75	1 - 3
cutleaf ironplant	MAPI	9	0 - 26	0 - 1	9	0 - 20	0 - 1				9	0 - 25	0 - 1
dotted gayfeather	LIPU	9	26 - 52	1 - 2	9	20 - 60	1 - 3	9	0 - 15	0 - 1	9	0 - 50	0 - 2
false boneset	BREU	9	26 - 52	1 - 2	9	0 - 40	0 - 2	9	0 - 15	0 - 1	9	0 - 50	0 - 2
false gromwell	ONMO	9	26 - 52	1 - 2	9	0 - 40	0 - 2	9	0 - 15	0 - 1	9	0 - 50	0 - 2
goldenrod	SOLID	9	26 - 78	1 - 3	9	20 - 80	1 - 4	9	15 - 45	1 - 3	9	25 - 125	1 - 5
green sawwort	ARDR4	9	0 - 52	0 - 2	9	20 - 60	1 - 3	9	15 - 60	1 - 4	9	25 - 75	1 - 3
heath aster	SYER	9	0 - 52	0 - 2	9	20 - 60	1 - 3	9	15 - 30	1 - 2	9	25 - 100	1 - 4
penstemon	PENST	9	0 - 26	0 - 1									
prairie coneflower	RACO3	9	26 - 52	1 - 2	9	0 - 20	0 - 1				9	0 - 50	0 - 2
purple coneflower	ECAN2	9	26 - 52	1 - 2							9	0 - 25	0 - 1
puss-toes	ANTEN	9	0 - 26	0 - 1	9	0 - 20	0 - 1	9	0 - 15	0 - 1	9	0 - 25	0 - 1
rush skeletonweed	LYJU	9	0 - 26	0 - 1	9	0 - 20	0 - 1	9	0 - 15	0 - 1	9	0 - 25	0 - 1
scarlet gaura	GACO5	9	0 - 26	0 - 1							9	0 - 25	0 - 1
scarlet globemallow	SPCO	9	26 - 52	1 - 2	9	20 - 40	1 - 2	9	0 - 15	0 - 1	9	0 - 25	0 - 1
scurfpea	PSORA2	9	26 - 78	1 - 3	9	20 - 80	1 - 4	9	15 - 45	1 - 3	9	25 - 75	1 - 3
stiff sunflower	HEPA19	9	26 - 52	1 - 2	9	0 - 20	0 - 1						
sweetclover	MELIL				9	0 - 100	0 - 5	9	0 - 75	0 - 5	9	0 - 150	0 - 6
western ragweed	AMPS	9	26 - 52	1 - 2	9	20 - 60	1 - 3	9	15 - 30	1 - 2	9	25 - 75	1 - 3
western salsify	TRDU				9	0 - 60	0 - 3	9	15 - 45	1 - 3	9	25 - 75	1 - 3
native forbs	2FN	9	0 - 78	0 - 3	9	0 - 60	0 - 3	9	0 - 45	0 - 3	9	0 - 75	0 - 3
introduced forbs	2FI				9	0 - 100	0 - 5	9	0 - 75	0 - 5	9	0 - 125	0 - 5
SHRUBS		10	130 - 260	5 - 10	10	100 - 200	5 - 10	10	30 - 120	2 - 8	10	125 - 300	5 - 12
fringed sawwort	ARFR4	10	26 - 78	1 - 3	10	20 - 100	1 - 5	10	15 - 75	1 - 5	10	25 - 75	1 - 3
leadplant	AMCA6	10	26 - 130	1 - 5	10	0 - 40	0 - 2						
plains pricklypear	OPPO	10	0 - 52	0 - 2	10	0 - 60	0 - 3	10	0 - 45	0 - 3	10	0 - 50	0 - 2
rose	ROSA5	10	26 - 78	1 - 3	10	20 - 60	1 - 3	10	0 - 30	0 - 2	10	25 - 75	1 - 3
western snowberry	SYOC	10	26 - 78	1 - 3	10	20 - 100	1 - 5	10	15 - 45	1 - 3	10	50 - 250	2 - 10
other shrubs	2SHRUB	10	0 - 52	0 - 2	10	0 - 60	0 - 3	10	0 - 30	0 - 2	10	0 - 125	0 - 5
TREES		11			11	0 - 100	0 - 5	11	0 - 75	0 - 5	11	0 - 125	0 - 5
boxelder	ACNE2				11	0 - 60	0 - 3	11	0 - 45	0 - 3	11	0 - 75	0 - 3
bur oak	QUMA2				11	0 - 60	0 - 3	11	0 - 45	0 - 3	11	0 - 75	0 - 3
eastern redcedar	JUVI				11	0 - 60	0 - 3	11	0 - 45	0 - 3	11	0 - 75	0 - 3
green ash	FRPE				11	0 - 60	0 - 3	11	0 - 45	0 - 3	11	0 - 75	0 - 3
hackberry	CEOC				11	0 - 60	0 - 3	11	0 - 45	0 - 3	11	0 - 75	0 - 3
ponderosa pine	PIPO				11	0 - 60	0 - 3	11	0 - 45	0 - 3	11	0 - 75	0 - 3
Rocky Mountain juniper	JJUSC2				11	0 - 60	0 - 3	11	0 - 45	0 - 3	11	0 - 75	0 - 3
other trees	2TREE				11	0 - 60	0 - 3	11	0 - 45	0 - 3	11	0 - 75	0 - 3
Annual Production lbs./acre			LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		
GRASSES & GRASS-LIKES			1550 - 2210 - 3050		1010 - 1650 - 2285		705 - 1275 - 1640		1460 - 2038 - 2770				
FORBS			125 - 195 - 275		95 - 150 - 205		70 - 113 - 155		120 - 188 - 275				
SHRUBS			125 - 195 - 275		95 - 150 - 205		25 - 75 - 125		120 - 213 - 325				
TREES					0 - 50 - 105		0 - 38 - 80		0 - 63 - 130				
TOTAL			1800 - 2600 - 3600		1200 - 2000 - 2800		800 - 1500 - 2000		1700 - 2500 - 3500				

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. RV = Representative value. Refer to PLANTS database for scientific names and codes: <http://plants.usda.gov>

Plant Community and Vegetation State Narratives

Following are the narratives for each of the described plant communities. These plant communities may not represent every possibility but they 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 Natural Resources Conservation Service (NRCS) National Range and Pasture Handbook, Desired Plant Communities (DPCs) 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.

Needlegrass/Western Wheatgrass/Bluestem Plant Community

Interpretations are primarily based on the Needlegrass/Western Wheatgrass/Bluestem Plant Community, which is also considered climax. The site evolved with grazing by large herbivores and occasional fire. The potential vegetation is about 80 percent grasses or grass-like plants, 10 percent forbs, and 10 percent shrubs. This plant community is dominated by mid- and tall cool-season grasses. Warm-season mid- and tall grasses are subdominant. Principal grasses are green needlegrass, needleandthread, western wheatgrass, big bluestem, and little bluestem. Grama grasses and sedges occur as an understory. Common forbs include cudweed sagewort, dotted gayfeather, prairie coneflower, goldenrod, and scurfpea. Leadplant and rose are common shrubs, with western snowberry occurring in patches across the site.

Individual species can vary greatly in production depending on growing conditions (timing and amount of precipitation and temperature). Community dynamics, nutrient cycle, water cycle, and energy flow are functioning at the sites potential. Plant litter is properly distributed with some movement offsite and natural plant mortality is low. This plant community is highly drought tolerant due to factors such as high species diversity, varied root structures, and high soil quality.

The following growth curve shows the estimated monthly percentages of total annual growth of the dominant species expected during a normal year:

Growth curve number: NE6635

Growth curve name: Eroded Tableland, cool-season dominant, warm-season subdominant.

Growth curve description: Cool-season dominant, warm-season subdominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	5	10	25	30	15	5	5	5	0	0

Transitional pathways and/or community pathways leading to other plant communities are as follows:

- Continuous season-long grazing or continuous seasonal grazing (grazing at the same time of year every year) will convert the plant community to the *Blue Grama/Western Wheatgrass/Bluegrass Plant Community*.

Blue Grama/Western Wheatgrass/Bluegrass Plant Community

This plant community develops under continuous seasonal grazing (i.e., grazing an area during the same season every year) or from continuous season-long grazing. The potential vegetation is made up of approximately 80 percent grasses and grass-like species, 10 percent forbs, and 10 percent shrubs. The dominant grasses include blue grama, western wheatgrass, bluegrass, and threadleaf sedge. Other grasses may include needleandthread, smooth bromegrass, buffalograss, sideoats grama, prairie Junegrass, red threeawn, and little bluestem.

The dominant forbs include cudweed sagewort, goldenrod, scurfpea, western ragweed, green sagewort, scarlet globemallow, and sometimes sweetclover. Dominant shrubs in this community include western snowberry and wild rose. Fringed sagewort may also be present in significant amounts. Compared to the Needlegrass/Western Wheatgrass/Bluestem Plant Community, the shortgrass species including blue grama, bluegrass, sedge, and buffalograss have increased. The cool-season needlegrass species and the mid- and tall warm-season grasses have decreased in composition. Annual bromes, bluegrass, smooth brome, and annual forbs can invade the site. While plant diversity is relatively high, the structure of the community is dominated by shortgrasses.

The dominant herbaceous species are very adapted to grazing; however, mid- to tall grass species and palatable forbs will decrease in the community through long-term overgrazing. Soil erosion is low. Because of the sod forming habit of the shortgrass species, water infiltration is reduced and runoff is moderate. Typically, the runoff is very clean because of the low potential for soil erosion.

The following growth curve shows the estimated monthly percentages of total annual growth of the dominant species expected during a normal year:

Growth curve number: NE6635

Growth curve name: Eroded Tableland, cool-season dominant, warm-season subdominant.

Growth curve description: Cool-season dominant, warm-season subdominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	5	10	25	30	15	5	5	5	0	0

Transitional pathways and/or community pathways leading to other plant communities are as follows:

- Continuous season-long grazing or continuous seasonal grazing without adequate rest periods will convert the plant community to the *Blue Grama/Bluegrass/Sedge Sod Plant Community*. If this grazing impact is extreme, this plant community could shift directly to the *Threeawn/Forbs Plant Community*.
- Prescribed grazing will move this plant community back to the *Needlegrass/Western Wheatgrass/Bluestem Plant Community*.

Blue Grama/Bluegrass/Sedge Sod Plant Community

This plant community is the result of heavy continuous season-long grazing and/or repeated seasonal grazing (typically in the spring/early summer). Blue grama, bluegrass, sedge, and buffalograss are the dominant species with the balance being a few species of cool-season grasses, warm-season grasses and miscellaneous forbs. Some of the minor species are western wheatgrass, threeawn, needleandthread, and sand dropseed. Forbs present include western salsify, western ragweed, cudweed sagewort, curlycup gumweed and green sagewort. The dominant shrubs include fringed sagewort and cactus. There is usually less than 10 percent bare ground. When compared to the Needlegrass/Western Wheatgrass/Bluestem Plant Community, blue grama and buffalograss have increased significantly. The mid- to tall grasses have declined dramatically. Annual production has decreased significantly.

This plant community is resistant to change, as the dominant species are resistant to overgrazing. The thick sod prevents other species from getting established. Infiltration will decrease and runoff will increase. Soil erosion will be minimal due to the sod forming habit of blue grama and bluegrass. This could be advantageous for heavy use areas such as calving/lambing units since the grazing tolerant species will control erosion, and increase production to adjacent dams. However, nutrient runoff could be a potential problem.

Growth curve number: NE6637

Growth curve name: Eroded Tableland, warm-season dominant, cool-season subdominant.

Growth curve description: Warm-season dominant, cool-season subdominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	5	8	15	24	23	15	5	5	0	0

Transitional pathways and/or community pathways leading to other plant communities are as follows:

- Heavy continuous season-long grazing or defoliation (severe trampling and/or concentrated livestock use or due to rodent activity) will convert this plant community to the *Threeawn/Forbs Plant Community*.
- Long-term prescribed grazing may move this plant community back to a plant community resembling the *Needlegrass/Western Wheatgrass/Bluestem Plant Community*. This may not be possible and/or the resulting plant community may still contain significant amounts of invasive species such as Kentucky bluegrass.

Bluegrass/Western Wheatgrass/Smooth Bromegrass Plant Community

This plant community developed under repeated seasonal grazing (typically during the summer) or under extended periods of nonuse and no fire where a heavy litter layer builds up that can favor cool-season species and invasion of bluegrass, annual brome, and other invaders. Initially, the dominant grasses include bluegrass, western wheatgrass, needleandthread, and green needlegrass. Other grasses may include blue grama, buffalograss, threeawn, and prairie Junegrass. With continued seasonal grazing and/or nonuse and no fire, the plant community becomes dominated by bluegrass, smooth bromegrass, annual brome, and other annual species. Sedges will flourish in the understory. The dominant forbs include western ragweed, scurpeas, cudweed sagewort, and verbenas. Dominant shrubs in this community include snowberry, rose, and plains pricklypear. Compared to the Needlegrass/Western Wheatgrass/Bluestem Plant Community, bluegrass increases significantly. Needlegrasses and the mid- and tall warm-season grasses decrease. Plant diversity declines.

This plant community is resistant to change, and if disturbed, it is resilient. Bluegrass will increase under grazing pressure. Cool, moist climatic conditions will also tend to increase bluegrass production. Soil erosion is low. Compared to the Needlegrass/Western Wheatgrass/Bluestem Plant Community, infiltration is reduced, and runoff increases. Once this plant community is reached, time and external resources will be needed to see any immediate recovery in the diversity.

The following growth curve shows the estimated monthly percentages of total annual growth of the dominant species expected during an average year:

Growth curve number: NE6634

Growth curve name: Eroded Tableland, cool-season dominant.

Growth curve description: Cool-season dominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	5	15	28	30	10	2	5	5	0	0

Transitional pathways and/or community pathways leading to other plant communities are as follows:

- With prescribed grazing, prescribed burning followed by prescribed grazing or other management practices (i.e., different livestock species/classes, management intensive grazing, etc.), this plant community may move toward the *Needlegrass/Western Wheatgrass/Bluestem*

Plant Community. This would require long-term prescribed grazing at moderate rates with favorable climatic conditions.

- Encroachment (or escaped), non-use and no fire will lead to the *Conifer/Deciduous Plant Community*. This occurs when this plant community is protected from natural fires, or controlled burning. Nonuse causes litter to accumulate resulting in a greater space between individual plants, allowing places for tree seedlings to get a start. Juniper species tend to escape from wildlife plantings and/or shelterbelts.

Threawn/Forbs Plant Community

This plant community developed under continuous heavy grazing or other excessive disturbances (e.g., heavy use areas, defoliation by rodents, etc.). The potential plant community is made up of approximately 80 percent grasses and grass-like species and 15-20 percent forbs. The dominant grasses include threawn, cheatgrass, and panicum species. Other grasses may include blue grama, buffalograss, sedges, western wheatgrass, and sixweeks fescue. The dominant forbs include fringed sagewort, fetid marigold, western ragweed, pussytoes, prostrate verbena, and other invader-like species. This plant community is susceptible to invasion of Canada thistle and other nonnative species because of the high percent of bare ground. Compared to the Needlegrass/Western Wheatgrass/Bluestem Plant Community, red threawn, annual brome grasses, and percent of bare ground has increased. Western wheatgrass, needlegrasses, and other cool-season grasses have decreased as have the warm-season species including big bluestem, little bluestem, and sideoats grama. Plant diversity is low (plant richness may be high, but areas are dominated by a few species and evenness is lacking).

This plant community is very resistant to change because of the loss of plant diversity and overall soil disturbance. Soil erosion is potentially very high because of the bare ground and shallow rooted herbaceous plant community. Water runoff is increased and infiltration is decreased. This plant community will require significant economic inputs and time to move towards another plant community. This movement is highly variable in its succession. This is due to the loss of diversity (including the loss of the seed bank), within the existing plant community, and on adjacent ecological sites (ES). This community can be renovated to improve the production capability; however, if management changes are not made, the vegetation could revert back to a threawn/forbs community.

The following growth curve shows the estimated monthly percentages of total annual growth of the dominant species expected during an average year:

Growth curve number: NE6637

Growth curve name: Eroded Tableland, warm-season dominant, cool-season subdominant.

Growth curve description: Warm-season dominant, cool-season subdominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	5	8	15	24	23	15	5	5	0	0

Transitional pathways and/or community pathways leading to other plant communities are as follows:

- Under long-term prescribed grazing, including adequate rest periods, this plant community may move through the successional stages leading to the *Needlegrass/Western Wheatgrass/Bluestem Plant Community*. Depending on the slope, aspect, and size, and if adequate perennial plants exist, this transition can occur more rapidly.

Conifer/Deciduous Plant Community

This plant community can develop whenever conifer and/or deciduous trees occur adjacent to the

originating plant community, and encroachment of various species occurs. On the upper slopes where this site occurs, ponderosa pine and/or eastern redcedar are typically the first species to encroach/increase. On the lower slopes, typically various deciduous trees followed by eastern redcedar are the first to encroach/increase. In any case, eastern redcedar can become dominant.

When this occurs a closed canopy of eastern redcedar may result. Because of fire suppression over many years, this plant community will develop extensive ladder fuels which can lead to a removal of most tree species with a wildfire. With properly managed intensive grazing, encroachment of deciduous trees will be minimal; however, this will not impact encroachment of conifer species. This plant community is made up of trees with a canopy cover of 50 percent or greater consisting of trees generally 12 feet or taller. The herbaceous component decreases proportionately in relation to the percent canopy cover, with the reduction being greater under a conifer overstory.

This plant community is resistant to change and resilient given normal disturbances. In higher canopy cover situations, the soil erosion will increase in relation to most of the plant communities from which this plant community originated. The water cycle is also significantly altered under higher canopy cover. Infiltration is reduced and runoff is typically increased because of a lack of herbaceous cover and the rooting structure provided by the herbaceous species.

The following growth curve shows the estimated monthly percentages of total annual growth of the dominant species expected during a normal year:

Growth curve number: NE6644

Growth curve name: Eroded Tableland, heavy tree canopy.

Growth curve description: Mature conifer/deciduous overstory.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	3	7	10	20	28	15	5	4	4	2	1

Transitional pathways and/or community pathways leading to other plant communities are as follows:

- With actions that will remove the tree overstory (prescribed burning, wildfire and/or harvest), followed by prescribed grazing, succession will progress leading to the *Needlegrass/Western Wheatgrass/Bluestem Plant Community*.

Go-back land, Seeded, or Invaded

This group includes four separate vegetation states that are highly variable in nature. They are derived through three distinct scenarios and are not related successional. Infiltration, runoff, and soil erosion varies depending on the vegetation present on the site.

The **Go-back** state can be reached whenever severe mechanical disturbance occurs. The vegetation on this plant community varies greatly, sometimes being dominated by Scribner panicum, bluegrass, three-awn, sand dropseed, marestalk, green sagewort, and/or ragweed. Other plants that commonly occur on this plant community include six-weeks fescue, prairie sandreed, witchgrass, little bluestem, switchgrass, and needleandthread. Annual grasses and forbs have become established in the plant community.

The **Seeded** state is normally those areas seeded to native or nonnative species. It requires considerable investment to establish and has a variable life expectancy. In this case, the dynamics of the established plant community will no longer be described in this ES description and reference should be made to the associated Forage Suitability Group Description.

The **Invaded** state includes areas that have been invaded and are dominated by species such as smooth brome, Kentucky bluegrass, crested wheatgrass, nonnative thistles, field bindweed, knapweeds, leafy spurge, hoary cress, and other introduced species.

Ecological Site Interpretations

Animal Community – Wildlife Interpretations

-- Under Development --

Needlegrass/Western Wheatgrass/Bluestem Plant Community:

Blue Grama/Western Wheatgrass/Bluegrass Plant Community:

Blue Grama/Bluegrass/Sedge Sod Plant Community:

Threeawn/Forbs Plant Community:

Bluegrass/Western Wheatgrass/Smooth Bromegrass Plant Community:

Conifer/Deciduous Plant Community:

Animal Preferences (Quarterly – 1,2,3,4†)

Common Name	Cattle	Sheep	Horses	Deer	Antelope	Bison	Elk
Grasses and Grass-likes							
big bluestem	U D P D	U D U U	U D P D	U D U U	U D U U	U D P D	U D P D
blue grama	U D P U	D P P D	U D P U	D P P D	D P P D	U D P U	U D P U
buffalograss	U U D U	N U D U	U U D U	N U D U	N U D U	U U D U	U U D U
green needlegrass	U P U D	N P N P	U P U D	N P N P	N P N P	U P U D	U P U D
Indiangrass	U D P D	U D U U	U D P D	U D U U	U D U U	U D P D	U D P D
little bluestem	U D D U	N D N N	U D D U	N D N N	N D N N	U D D U	U D D U
needleandthread	U D U D	N D N U	U D U D	N D N U	N D N U	U D U D	U D U D
plains muhly	U U D U	U U D U	U U D U	N N N N	N N N N	U U D U	U U D U
porcupine grass	U P U D	N D N U	U P U D	N D N U	N D N U	U P U D	U P U D
prairie dropseed	N U P U	N U D U	N U P U	N U D U	N U D U	N U P U	N U P U
prairie junegrass	U D U D	N D N U	U D U D	N D N U	N D N U	U D U D	U D U D
sand dropseed	N U N N	N U N N	N U N N	N U N N	N U N N	N U N N	N U N N
Scribner panicum	U U D U	N U N N	U U D U	N U N N	N U N N	U U D U	U U D U
sideoats grama	U D P U	U P D U	U D P U	U P D U	U P D U	U D P U	U D P U
switchgrass	U D D U	U D U U	U D D U	N N N N	N N N N	U D D U	U D D U
threadleaf sedge	U D U D	U P N D	U D U D	U D U D	U D U D	U D U D	U D U D
threeawn	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N
western wheatgrass	U P D U	N D N N	U P D U	N D N N	N D N N	U P D U	U P D U
Forbs							
blue verben	U U U U	U U D U	U U U U	U U D U	U U D U	U U U U	U U D U
blue-eyed grass	U U U U	U U P U	U U U U	U U P U	U U P U	U U U U	U U P U
bush morningglory	U D P U	U D D U	U D P U	U D D U	U D D U	U D P U	U D D U
catclaw sensitive brier	U D P U	U P P U	U D P U	U P P U	U P P U	U D P U	U P P U
cudweed sagewort	U U U U	U U D U	U U U U	U U D U	U U D U	U U U U	U U D U
cutleaf ironplant	U U U U	N U U N	U U U U	N U U N	N U U N	U U U U	N U U N
dotted gayfeather	U U D U	U P P U	U U D U	U P P U	U P P U	U U D U	U P P U
false boneset	U U D U	N D U N	U U D U	N D U N	N D U N	U U D U	N D U N
false gromwell	U U U U	N N N N	U U U U	N N N N	N N N N	U U U U	N N N N
goldenrod	U U D U	N U U N	U U D U	N U U N	N U U N	U U D U	N U U N
green sagewort	U U U U	U U U U	U U U U	U U U U	U U U U	U U U U	U U U U
heath aster	U U D U	U U P U	U U D U	U U P U	U U P U	U U D U	U U P U
penstemon	U U U U	U P P U	U U U U	U P P U	U P P U	U U U U	U P P U
prairie coneflower	U U D U	U P P U	U U D U	U P P U	U P P U	U U D U	U P P U
purple coneflower	U U D U	U P P U	U U D U	U P P U	U P P U	U U D U	U P P U
pussytoes	U U U U	U U U U	U U U U	U U U U	U U U U	U U U U	U U U U
rush skeletonweed	U U U U	N N N N	U U U U	N N N N	N N N N	U U U U	N N N N
scarlet gaura	U U U U	N U U N	U U U U	N U U N	N U U N	U U U U	N U U N
scarlet globemallow	U U D U	U D D U	U U D U	U D D U	U D D U	U U D U	U D D U
scurfpea	U U U U	N U U N	U U U U	N U U N	N U U N	U U U U	N U U N
stiff sunflower	U D P U	U D P U	U D P U	U D P U	U D P U	U D P U	U D P U
western ragweed	U U U U	N N N N	U U U U	N N N N	N N N N	U U U U	N N N N
Shrubs							
fringed sagewort	U U U U	U U U U	U U U U	U D D U	U P P D	U U U U	U U U D
leadplant	U P D U	U P D U	U P D U	U P D U	U P D U	U P D U	U P D U
plains pricklypear	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N
rose	U D D U	U D D U	U D D U	U D D U	U D D U	U D D U	U D D U
western snowberry	U U U U	U U U U	U U U U	D U D D	U U U U	U U U U	D U U U

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

† Quarters: 1 – Jan., Feb., Mar.; 2 – Apr., May, Jun.; 3 – Jul., Aug., Sep.; 4 – Oct., Nov., Dec.

Animal Community – Grazing Interpretations

The following table lists annual, suggested initial stocking rates with average growing conditions. These are conservative estimates that should be used only as guidelines in the initial stages of conservation planning. Often, the current plant composition does not entirely match any particular plant community (as described in this ES description). Because of this, a resource inventory is necessary to document plant composition and production. More accurate carrying capacity estimates should eventually be calculated using the following stocking rate information along with animal preference data and actual stocking records, particularly when grazers other than cattle are involved. With consultation of the land manager, more intensive grazing management may result in improved harvest efficiencies and increased carrying capacity.

As this site improves in condition through proper management (from the more shortgrass dominated plant communities to the Needlegrass/Western Wheatgrass/Bluestem Plant Community), the advantage for livestock production includes: higher forage production from cool season grasses, improved early spring forage production and higher water infiltration. The disadvantage for livestock include: reduction in cool/warm season grass mix which would provides better management flexibility, less plant diversity, and a potential increase in soil erosion. The Threeawn/Annuals Plant Community is of limited value for livestock production.

Plant Community	Average Annual Production (lbs./acre, air-dry)	Stocking Rate* (AUM/acre)
Needlegrass/Western Wheatgrass/Bluestem	2,600	0.70 – 0.75
Blue Grama/Western Wheatgrass/Bluegrass	2,000	0.50 – 0.55
Bluegrass/Western Wheatgrass/Smooth Bromegrass	2,500	**
Blue Grama/Bluegrass/Sedge Sod	1,500	0.40 – 0.45
Conifer/Deciduous	800	**
Threeawn/Forbs	700	0.15 – 0.20

*Based on 912 lbs./acre (air-dry weight) per Animal Unit Month (AUM) and on 25 percent harvest efficiency (refer to United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), National Range and Pasture Handbook).

**Highly variable; stocking rate needs to be determined onsite.

Grazing by domestic livestock is one of the major income-producing industries in the area. Rangeland in this area may provide yearlong forage. During the dormant period, the forage for livestock will likely be lacking protein to meet livestock requirements, and added protein will allow ruminants to better utilize the energy stored in grazed plant materials. A forage quality test (either directly or through fecal sampling) should be used to determine the level of supplementation needed.

Hydrology Functions

Water is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group B. Infiltration and runoff potential for this site varies from moderate to high depending on soil hydrologic group, slope and ground cover. In many cases, areas with greater than 75 percent ground cover have the greatest potential for high infiltration and lower runoff. An example of an exception would be where shortgrasses form a strong sod and dominate the site. Areas where ground cover is less than 50 percent have the greatest potential to have reduced infiltration and higher runoff (refer to Section 4, NRCS National Engineering Handbook for runoff quantities and hydrologic curves).

For the interpretive plant community, 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 little bluestem. Litter typically falls in place and signs of movement are not common. Chemical and physical crusts are rare to nonexistent. Cryptogamic crusts are present but only cover one-to-two percent of the soil surface. Overall, this site has the appearance of being very stable and productive.

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

Other Products

Seed harvest of native plant species can provide additional income on this site.

Supporting Information

Associated Sites

(066XY026NE) – Loamy Overflow

(066XY032NE) – Sandy 18-22" P.Z.

(066XY062NE) – Shallow to Gravel

(066XY059NE) – Thin Upland

Similar Sites

(066XY026NE) – Loamy Overflow[big bluestem dominant; occurs in concave positions; more productive]

Inventory Data References

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range-trained personnel were also used. Those involved in developing this site include: Wayne Bachman, Soil Scientist (SS), NRCS; Stan Boltz, Range Management Specialist (RMS), NRCS; Chuck Markley, SS, NRCS; Anna Ferguson, Soil Conservationist, NRCS; Roger Hammer, SS, NRCS; Dana Larsen, RMS, NRCS; Dave Schmidt, RMS, NRCS; and Kim Stine, RMS, NRCS.

State Correlation

This site has been correlated with SD and NE in MLRA 66.

Field Offices Counties

Ainsworth, NE Brown, Keya Paha & Rock

Martin, SD Bennett & Shannon

Valentine, NE Cherry

Field Offices Counties

White River, SD Mellette, Todd

Winner, SD Tripp

Relationship to Other Established Classifications

Level IV Ecoregions of the Conterminous United States: 43i – Keya Paha Tablelands.

Other References

High Plains Regional Climate Center, University of Nebraska, 830728 Chase Hall, Lincoln, NE 68583-0728. (<http://www.hprcc.unl.edu/>)

USDA, NRCS. National Water and Climate Center, 101 SW Main, Suite 1600, Portland, OR 97204-3224. (<http://wcc.nrcs.usda.gov>)

USDA, NRCS. National Range and Pasture Handbook, September 1997

USDA, NRCS. National Soil Information System, Information Technology Center, 2150 Centre Avenue, Building A, Fort Collins, CO 80526. (<http://nasis.nrcs.usda.gov>)

USDA, NRCS, 2002. National Soil Survey Handbook, title 430-VI.
<http://soils.usda.gov/technical/handbook/>

Site Description Approval

SD, State Range Management Specialist

Date

NE, State Range Management Specialist

Date