

United States Department of Agriculture Natural Resources Conservation Service

Ecological Site Description

Site Name: Loamy

Site Type: Rangeland

Site ID: R054XY031ND

Major Land Resource Area (MLRA): 54 – Rolling Soft Shale Plain

For more information on MLRA's, refer to the following web site: http://www.essc.psu.edu/soil_info/soil_lrr/.



Physiographic Features

This site occurs on gently undulating to rolling sedimentary uplands.

Landform: alluvial fan, alluvial flat, hill, knoll, and terrace. **Aspect:** NA

	<u>Minimum</u>	<u>Maximum</u>
Elevation (feet):	1600	3600
Slope (percent):	0	20
Water Table Depth (inches):	48	>72
Flooding:		
Frequency:	None	None
Duration:	None	None
Ponding:		
Depth (inches):	None	None
Frequency:	None	None
Duration:	None	None
Runoff Class:	Medium	Very high

Climatic Features

MLRA 54 is considered to have a continental climate – cold winters and hot summers, low humidity, light rainfall, and much sunshine. Extremes in temperature are characteristic. The climate is the result of this MLRA's location in the geographic center of North America. There are few natural barriers on the northern Great Plains. The air masses move unobstructed across the plains and account for rapid changes in temperature.

Annual precipitation ranges from 14 to 18 inches per year. The normal average annual temperature is about 42°F. January is the coldest month with average temperatures ranging from about 13°F (Beach, North Dakota (ND),) to about 16°F (Bison, South Dakota (SD)). July is the warmest month with temperatures averaging from about 69°F (Beach, ND,) to about 72°F (Timber Lake, SD). The range of normal average monthly temperatures between the coldest and warmest months is about 57°F. This large annual range attests to the continental nature of this MLRA's climate. Hourly winds are estimated to average about 11 miles per hour annually, ranging from about 13 miles per hour

during the spring to about 10 miles per hour 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 miles per hour.

Growth of native cool-season plants begins in late March and continues to early to mid July. Native warm-season plants begin growth in mid May and continue to the end of August. Green up of cool-season plants can occur in September and October when adequate soil moisture is present.

	<u>Minimum</u>	<u>Maximum</u>
Frost-free period (days):	119	136
Freeze-free period (days):	139	157
Mean Annual Precipitation (inches):	14	18

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

	Precip. Min.	Precip. Max	Temp. Min.	Temp. Max.
January	0.41	0.54	2.2	23.8
February	0.37	0.61	8.7	30.4
March	0.51	1.07	17.1	40.0
April	1.13	1.88	28.9	56.8
May	1.98	2.83	40.5	69.3
June	2.83	3.29	49.8	78.3
July	2.05	2.25	54.6	85.2
August	1.49	2.07	53.0	84.3
September	1.29	1.45	42.0	73.4
October	0.89	1.35	31.6	60.4
November	0.48	0.61	19.0	41.5
December	0.42	0.55	8.1	29.0

Climate Stations		Period	
Station ID	Location or Name	From	To
ND0590	Beach	1949	1999
MT7560	Sidney	1949	1999
SD8307	Timber Lake	1948	1999
ND2183	Dickinson FAA AP	1948	1999

For local 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 common features to all soils in this site are the silt loam to clay loam textured subsoils and slopes of 0 to 20 percent. The soils in this site are well drained and formed in soft siltstone, sandstone, or alluvium. The loam to silt loam surface layer is 5 to 12 inches thick. The soils have a moderate infiltration rate. Waterflow patterns may be present, and there is a risk of rills and eventually gullies if vegetative cover is not adequate. Cryptobiotic crusts are present, but their function is not well understood. Some pedestalling of plants occurs, but it is not very evident on casual observation and occurs on less than five percent of the plants. Water flow paths are broken, irregular in appearance, or discontinuous with numerous debris dams or vegetative barriers. The soil surface is stable and intact

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Major soil series correlated to this ecological site can be found in Section II of the Natural Resources Conservation Service (NRCS) Field Office Technical Guide or the following web sites:

North Dakota: <http://www.nd.nrcs.usda.gov>.
South Dakota: <http://www.sd.nrcs.usda.gov>.
Montana: <http://www.mt.nrcs.usda.gov>.

Parent Material Kind: alluvium, residuum, and glacial till
Parent Material Origin: sandstone, siltstone
Surface Texture: loam, silt loam, silty clay loam
Surface Texture Modifier: none
Subsurface Texture Group: loamy
Surface Fragments ≤ 3” (% Cover): 0
Surface Fragments > 3” (%Cover): 0
Subsurface Fragments ≤ 3” (% Volume): 0-20
Subsurface Fragments > 3” (% Volume): 0-10

	<u>Minimum</u>	<u>Maximum</u>
Drainage Class:	well	well
Permeability Class:	moderately slow	moderate
Depth to first restrictive layer (inches):	20	72
Electrical Conductivity (mmhos/cm)*:	0	4
Sodium Absorption Ratio*:	0	5
Soil Reaction (1:1 Water)*:	6.1	8.4
Soil Reaction (0.1M CaCl₂)*:	NA	NA
Available Water Capacity (inches)*:	5	9
Calcium Carbonate Equivalent (percent)*:	0	10

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

Plant Communities

Ecological Dynamics of the Site:

The site 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 climatic conditions and/or management actions. Due to the nature of the soils, the site is considered moderately resilient. Under continued adverse impacts, a slow decline in vegetative vigor and composition will occur. Under favorable vegetative management treatments, the site can readily return to the Historic Climax Plant Community (HCPC).

The plant community upon which interpretations are primarily based is the HCPC. The HCPC has been determined by study of rangeland relic areas, areas protected from excessive disturbance, and areas 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 considered. Subclimax plant communities, states, transitional pathways, and thresholds have been determined through similar studies and experience

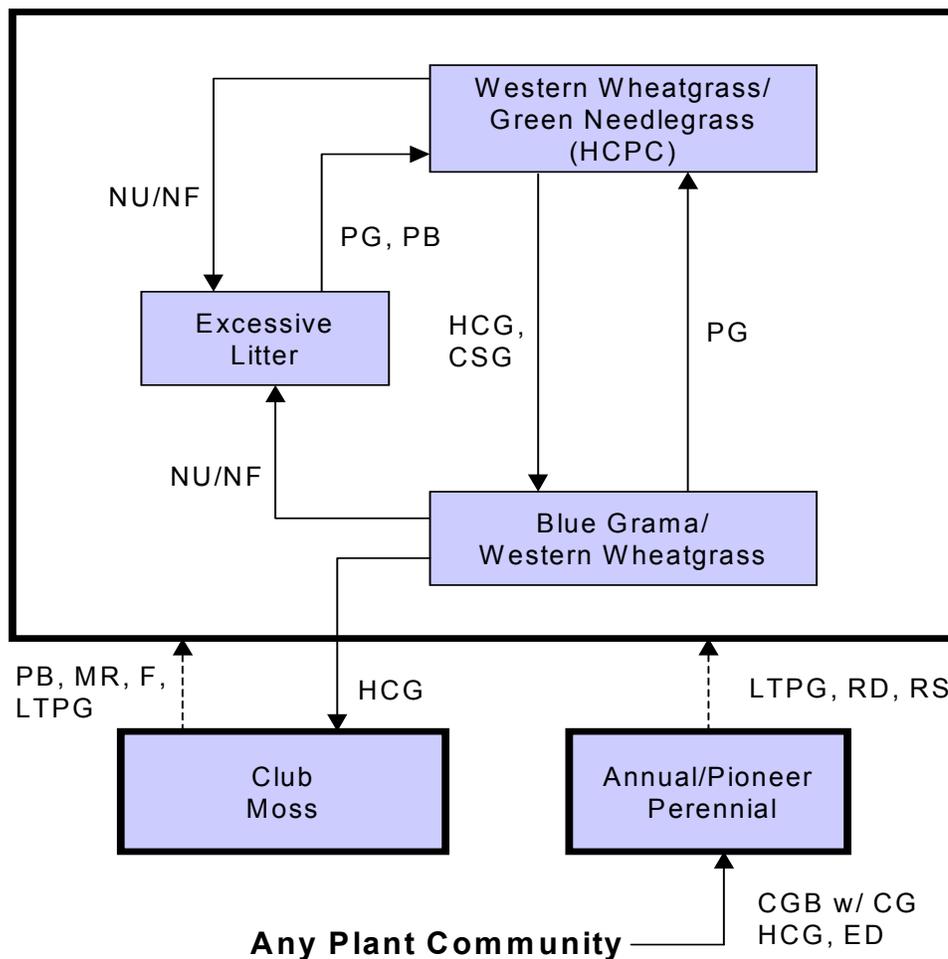
Heavy continuous grazing and/or continuous seasonal (spring) grazing, without adequate recovery periods following each grazing occurrence causes this site to depart from the HCPC. Blue grama will begin to increase. Western wheatgrass will increase initially and then begin to decrease. Green needlegrass will decrease in frequency and production. In time, heavy, continuous grazing will likely cause upland sedges and blue grama to dominate and pioneer perennials, annuals, and club moss (in its range) to increase. This plant community is relatively stable and the competitive advantage

prevents other species from establishing. This plant community is less productive than the HCPC. Runoff increases and infiltration will decrease. Soil erosion will be minimal.

Extended periods of non-use and/or lack of fire will result in a plant community having high litter levels, which favors an increase in Kentucky bluegrass and/or smooth brome grass. In time, shrubs such as western snowberry and chokecherry will likely increase.

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



CGB w/ CG - cropped go-back with continuous grazing; **CSG** - continuous seasonal grazing; **ED** - excessive defoliation; **F** - fertilization followed with prescribed grazing; **HCPC** - Historical Climax Plant Community; **HCG** - heavy continuous grazing; **LTPG** - long-term prescribed grazing; **MR** - mechanical renovation with prescribed grazing; **NU/NF** - extended period of non-use & no fire; **PB** - prescribed burning, followed by prescribed grazing; **PG** - prescribed grazing; **RD** - removal of disturbance; **RS** - range seeding with prescribed grazing

Plant Community Composition and Group Annual Production

		Western Wheatgrass/ Green Needlegrass (HCPC)			
COMMON/GROUP NAME	SYMBOL	Group	lbs./acre	% Comp	
GRASSES & GRASS-LIKES			2040 - 2280	85 - 95	
		1	960 - 1440	40 - 60	
western wheatgrass	PASM	1	480 - 720	20 - 30	
green needlegrass	NAVI4	1	360 - 480	15 - 20	
blue grama	BOGR2	1	120 - 240	5 - 10	
		2	120 - 240	5 - 10	
needleandthread	HECOC8	2	120 - 240	5 - 10	
porcupine grass	HESP11	2	48 - 168	2 - 7	
bearded wheatgrass	ELTRS	2	24 - 120	1 - 5	
OTHER NATIVE PERENNIALS		3	24 - 240	1 - 10	
plains reedgrass	CAMO	3	24 - 120	1 - 5	
Sandberg bluegrass	POSE	3	24 - 120	1 - 5	
prairie junegrass	KOMA	3	24 - 120	1 - 5	
big bluestem	ANGE	3	0 - 120	0 - 5	
sideoats grama	BOCU	3	0 - 120	0 - 5	
red threeawn	ARPUL	3	0 - 24	0 - 1	
other perennial grasses	2GP	3	0 - 72	0 - 3	
GRASS-LIKES		4	24 - 120	1 - 5	
needleleaf sedge	CADU6	4	24 - 120	1 - 5	
threadleaf sedge	CAFI	4	24 - 120	1 - 5	
other grass-likes	2GL	4	24 - 120	1 - 5	
FORBS		5	120 - 240	5 - 10	
American vetch	VIAM	5	24 - 48	1 - 2	
cudweed sagewort	ARLU	5	24 - 48	1 - 2	
dotted gayfeather	LIPU	5	0 - 48	0 - 2	
green sagewort	ARDR4	5	0 - 48	0 - 2	
groundplum milkvetch	ASCR2	5	24 - 48	1 - 2	
heath aster	SYER	5	24 - 48	1 - 2	
Missouri goldenrod	SOMI2	5	0 - 48	0 - 2	
prairie coneflower	RACO3	5	24 - 48	1 - 2	
prairie smoke	GETR	5	0 - 24	0 - 1	
purple coneflower	ECAN2	5	0 - 24	0 - 1	
purple prairie clover	DAPU5	5	24 - 48	1 - 2	
rush skeletonweed	LYJU	5	0 - 24	0 - 1	
scarlet globemallow	SPCO	5	0 - 24	0 - 1	
silverleaf scurfpea	PEAR6	5	24 - 48	1 - 2	
western yarrow	ACMI2	5	24 - 48	1 - 2	
wild onion	ALLIU	5	0 - 24	0 - 1	
other native forbs	2FORB	5	0 - 72	0 - 3	
SHRUBS		6	24 - 120	1 - 5	
prairie rose	ROAR3	6	0 - 24	0 - 1	
western snowberry	SYOC	6	24 - 48	1 - 2	
leadplant	AMCA6	6	0 - 24	0 - 1	
silver sagebrush	ARCA13	6	0 - 48	0 - 2	
winterfat	KRLA2	6	0 - 24	0 - 1	
fringed sagewort	ARFR4	6	24 - 48	1 - 2	
other shrubs	2SHRUB	6	0 - 48	0 - 2	
Annual Production lbs./acre			LOW	RV	HIGH
GRASSES & GRASS-LIKES			1265 -	2148	-3025
FORBS			115 -	180	-250
SHRUBS			20 -	72	-125
TOTAL			1400 -	2400	-3400

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	Western Wheatgrass/ Green Needlegrass (HCPC)			Blue Grama/ Western Wheatgrass			Excessive Litter			Club Moss		
		Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp
GRASSES & GRASS-LIKES			2040 - 2280	85 - 95		525 - 595	75 - 85		1760 - 1980	80 - 90		420 - 480	70 - 80
		1	960 - 1440	40 - 60	1	315 - 455	45 - 65	1	44 - 264	2 - 12	1	120 - 180	20 - 30
western wheatgrass	PASM	1	480 - 720	20 - 30	1	35 - 140	5 - 20	1	22 - 154	1 - 7	1	60 - 120	10 - 20
green needlegrass	NAV14	1	360 - 480	15 - 20	1	0 - 7	0 - 1	1	22 - 154	1 - 7	1	6 - 30	1 - 5
blue grama	BOGR2	1	120 - 240	5 - 10	1	280 - 350	40 - 50				1	12 - 48	2 - 8
		2	120 - 240	5 - 10	2	0 - 35	0 - 5	2	22 - 154	1 - 7	2	30 - 60	5 - 10
needleandthread	HECOC8	2	120 - 240	5 - 10	2	0 - 35	0 - 5	2	22 - 154	1 - 7	2	30 - 60	5 - 10
porcupine grass	HESP11	2	48 - 168	2 - 7									
bearded wheatgrass	ELTRS	2	24 - 120	1 - 5									
OTHER NATIVE PERENNIALS		3	24 - 240	1 - 10	3	0 - 35	0 - 5	3			3	30 - 90	5 - 15
plains reedgrass	CAMO	3	24 - 120	1 - 5									
Sandberg bluegrass	POSE	3	24 - 120	1 - 5	3	0 - 21	0 - 3				3	0 - 30	0 - 5
prairie junegrass	KOMA	3	24 - 120	1 - 5	3	0 - 7	0 - 1				3	30 - 60	5 - 10
big bluestem	ANGE	3	0 - 120	0 - 5									
sideoats grama	BOCU	3	0 - 120	0 - 5									
red threeawn	ARPUL	3	0 - 24	0 - 1									
other perennial grasses	ZGP	3	0 - 72	0 - 3	3	0 - 14	0 - 2						
GRASS-LIKES		4	24 - 120	1 - 5	4	0 - 21	0 - 3	4	0 - 22	0 - 1	4	6 - 30	1 - 5
needleleaf sedge	CADU6	4	24 - 120	1 - 5	4	0 - 21	0 - 3	4	0 - 22	0 - 1	4	6 - 30	1 - 5
threadleaf sedge	CAFI	4	24 - 120	1 - 5	4	0 - 21	0 - 3	4	0 - 22	0 - 1	4	6 - 30	1 - 5
other grass-likes	ZGL	4	24 - 120	1 - 5	4	0 - 21	0 - 3	4	0 - 22	0 - 1	4	6 - 30	1 - 5
INTRODUCED GRASSES		5			5			5	880 - 1320	40 - 60	5	0 - 60	0 - 10
Kentucky bluegrass	POPR							5	880 - 1320	40 - 60	5	0 - 60	0 - 10
smooth bromegrass	BRIN2							5	880 - 1320	40 - 60			
crested wheatgrass	AGCR							5	880 - 1320	40 - 60			
cheatgrass	BRTE							5	0 - 22	0 - 1			
FORBS		6	120 - 240	5 - 10	6	70 - 140	10 - 20	6	22 - 220	1 - 10	6	60 - 120	10 - 20
American vetch	VIAM	6	24 - 48	1 - 2	6	0 - 14	0 - 2						
cutweed sagewort	ARLU	6	24 - 48	1 - 2	6	0 - 14	0 - 2	6	0 - 44	0 - 2			
curlycup gumweed	GRSQ				6	0 - 14	0 - 2				6	0 - 12	0 - 2
dotted gayfeather	LIPU	6	0 - 48	0 - 2							6	0 - 12	0 - 2
green sagewort	ARDR4	6	0 - 48	0 - 2	6	0 - 14	0 - 2						
groundplum milkvetch	ASCR2	6	24 - 48	1 - 2									
heath aster	SYER	6	24 - 48	1 - 2									
larkspur	DELPH										6	0 - 12	0 - 2
Missouri goldenrod	SOMI2	6	0 - 48	0 - 2									
prairie coneflower	RACO3	6	24 - 48	1 - 2							6	0 - 12	0 - 2
prairie smoke	GETR	6	0 - 24	0 - 1									
purple coneflower	ECAN2	6	0 - 24	0 - 1							6	0 - 6	0 - 1
purple prairie clover	DAPU5	6	24 - 48	1 - 2									
rose pussytoes	ANRO2				6	0 - 14	0 - 2				6	0 - 12	0 - 2
rush skeletonweed	LYJU	6	0 - 24	0 - 1				6	0 - 44	0 - 2			
scarlet globemallow	SPOC	6	0 - 24	0 - 1	6	0 - 14	0 - 2				6	0 - 12	0 - 2
silverleaf scurpea	PEAR6	6	24 - 48	1 - 2	6	0 - 14	0 - 2						
spiny phlox	PHHO				6	0 - 14	0 - 2						
wayleaf thistle	CIUN				6	0 - 14	0 - 2	6	0 - 44	0 - 2	6	0 - 12	0 - 2
western salsify	TRDU							6	0 - 44	0 - 2			
western yarrow	ACMI2	6	24 - 48	1 - 2							6	0 - 12	0 - 2
white prairie aster	SYFA				6	0 - 14	0 - 2				6	0 - 12	0 - 2
wild onion	ALLIU	6	0 - 24	0 - 1									
other native forbs	2FORB	6	0 - 72	0 - 3	6	0 - 7	0 - 1	6	0 - 66	0 - 3			
non-native forbs	2FORB				6	0 - 56	0 - 8	6	0 - 220	0 - 10	6	0 - 30	0 - 5
SHRUBS		7	24 - 120	1 - 5	7	7 - 14	1 - 2	7	110 - 220	5 - 10	7	0 - 12	0 - 2
prairie rose	ROAR3	7	0 - 24	0 - 1	7	0 - 14	0 - 2				7	0 - 12	0 - 2
western snowberry	SYOC	7	24 - 48	1 - 2	7	0 - 14	0 - 2	7	110 - 220	5 - 10	7	0 - 12	0 - 2
leadplant	AMCA6	7	0 - 24	0 - 1									
silver sagebrush	ARCA13	7	0 - 48	0 - 2	7	0 - 14	0 - 2						
winterfat	KRLA2	7	0 - 24	0 - 1									
plains pricklypear	OPPO				7	0 - 14	0 - 2				7	0 - 12	0 - 2
brittle cactus	OPFR				7	0 - 14	0 - 2				7	0 - 12	0 - 2
purple pincushion	ESVIV				7	0 - 14	0 - 2						
fringed sagewort	ARFR4	7	24 - 48	1 - 2	7	7 - 14	1 - 2	7	0 - 44	0 - 2	7	0 - 12	0 - 2
broom snakeweed	GUSA2										7	0 - 12	0 - 2
other shrubs	2SHRUB	7	0 - 48	0 - 2									
CRYPTOGAMS		8			8			8			8	30 - 48	5 - 8
clubmoss	SEDE2										8	30 - 48	5 - 8
Annual Production lbs./acre			LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH
GRASSES & GRASS-LIKES			1265 - 2148 - 3025		330 - 585 - 840		1175 - 1914 - 2550		320 - 465 - 610				
FORBS			115 - 180 - 250		65 - 105 - 145		20 - 121 - 225		55 - 90 - 125				
SHRUBS			20 - 72 - 125		5 - 10.5 - 15		105 - 165 - 225		0 - 6 - 15				
CRYPTOGAMS									25 - 39 - 50				
TOTAL			1400 - 2400 - 3400		400 - 700 - 1000		1300 - 2200 - 3000		400 - 600 - 800				

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 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 are 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” (DPC). According to the USDA NRCS National Range and Pasture Handbook, 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.

Western Wheatgrass/Green Needlegrass Plant Community

This is the interpretive plant community and is considered to be the HCPC. This community evolved with grazing by large herbivores and occasional prairie fire. It is well suited for grazing by domestic livestock and can be found on areas that are properly managed with prescribed grazing that allows for proper utilization, changes in season of use, and adequate recovery periods following each grazing event.

The potential vegetation is about 85 percent grasses or grass-like plants, 10 percent forbs, and 5 percent shrubs. The plant community is dominated by western wheatgrass and green needlegrass. Other grasses and grass-like plants include needleandthread, blue grama, porcupine grass, bearded wheatgrass, and sedges. Significant forbs include American vetch, green sagewort, silverleaf scurfpea, and Missouri goldenrod. In many areas, western snowberry is the principal shrub and occurs in patchy mosaic. In other areas, silver sagebrush is the dominant shrub and occurs more evenly dispersed across the site. Other shrubs include prairie rose, leadplant, winterfat, and fringed sagewort.

This plant community is well adapted to the Northern Great Plains climatic conditions. 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 properly. Plant litter is properly distributed with very little movement offsite and natural plant mortality is very low. The diversity in plant species allows for high drought tolerance. Run-off from adjacent sites and moderate or high available water capacity provides a favorable soil-water-plant relationship.

The following growth curve is an estimate of the monthly percentages of total annual growth of the dominant species expected during a normal year.

Growth curve number: ND5401

Growth curve name: Missouri Slope, Native Grasslands, Cool-season Dominant.

Growth curve description: Cool-season, mid-grass dominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	3	8	24	45	10	3	5	2	0	0

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

- Non-use and no fire for extended periods of time will convert this plant community to the *Excessive Litter Plant Community*.
- Heavy, continuous grazing or continuous seasonal (spring) grazing will convert this plant community to the *Blue Grama/Western Wheatgrass Plant Community*.

- Excessive defoliation (i.e., areas of heavy animal concentration) will convert the plant community to the *Annual/Pioneer Perennial Plant Community*.
- Cropped go-back land with continuous grazing will convert this plant community to the *Annual/Pioneer Perennial Plant Community*.

Blue Grama/Western Wheatgrass Plant Community

This plant community is the result of long-term, heavy, continuous grazing and/or annual, early spring seasonal grazing. Repeated spring grazing depletes stored carbohydrates, resulting in weakening and eventual death of the cool season mid-grasses. Blue grama and western wheatgrass are the dominant species. Other grasses and grass-likes include sedges, needleandthread, prairie Junegrass, and annual grasses. Forbs such as western ragweed, scurfpea, cudweed sagewort, and scarlet globemallow may also be present. This plant community can occur throughout the pasture, on spot grazed areas, and around water sources where season-long grazing patterns occur.

This plant community is less productive than the HCPC. Lack of litter and reduced plant vigor result in higher soil temperatures, poor water infiltration rates, and high evapotranspiration, which gives blue grama a competitive advantage over cool season mid-grasses.

The following growth curve is an estimate of the monthly percentages of total annual growth of the dominant species expected during a normal year.

Growth curve number: ND5404

Growth curve name: Missouri Slope, Warm-season Dominant, Cool-season Subdominant.

Growth curve description: Short warm-season dominant, mid cool-season subdominant and club moss.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	1	5	20	38	25	8	3	0	0	0

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

- Heavy, continuous grazing may cause further deterioration resulting in a shift to the *Club Moss Plant Community*.
- Heavy, continuous grazing and/or excessive defoliation may shift this plant community to the *Annual/Pioneer Perennial Plant Community*.
- Non-use and no fire over an extended period of time may lead this plant community to the *Excessive Litter Plant Community*. This shift may take considerably longer than the corresponding transition from HCPC, depending on how much residual cool-season mid-grasses are present upon initiation of non-use or fire exclusion.
- Prescribed grazing that includes changing season of use and allowing adequate recovery periods to enhance cool season grasses will lead this plant community back to the *Western Wheatgrass/Green Needlegrass Plant Community*.

Excessive Litter Plant Community

This plant community develops after an extended period of 10 or more years of non-use by herbivores and exclusion of fire. Non-native grasses, such as Kentucky bluegrass, crested wheatgrass, and smooth brome tend to invade and may dominate this plant community. Other grasses present include western wheatgrass, porcupine grass, green needlegrass, and bearded wheatgrass. The common forbs include sweetclover, green sagewort, cudweed sagewort, and American vetch. Western snowberry is the principal shrub and tends to increase in density and cover.

Litter buildup reduces plant vigor and density, and native seedling recruitment declines. Due to a lack of tiller stimulation and sunlight, native bunchgrasses typically develop dead centers and native rhizomatous grasses are limited to small colonies. This plant community is dispersed throughout the pasture, encircling spot grazed areas, and areas distant from water sources. This is a typical pattern found in properly stocked pastures grazed season-long.

This plant community is resistant to change without prescribed grazing or fire. The combination of both grazing and fire is most effective in moving this plant community towards the HCPC. Soil erosion is low. Runoff is similar to the HCPC. Once this plant community is reached, time and external resources will be needed to see any immediate recovery in diversity.

The following growth curve is an estimate of the monthly percentages of total annual growth of the dominant species expected during a normal year:

Growth curve number: ND5406

Growth curve name: Missouri Slope, Introduced Cool-season Grasses.

Growth curve description: Introduced cool-season grasses.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	3	10	35	35	5	2	8	2	0	0

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

- Prescribed grazing or prescribed burning followed by prescribed grazing will move this plant community toward the *Western Wheatgrass/Green Needlegrass Plant Community (HCPC)*. This would require long-term management with prescribed grazing and/or prescribed burning under controlled conditions.

Club Moss Plant Community

This plant community typically occurs in the western portion of MLRA 54. A dense sod of club moss dominates this plant community. Club moss occupies bare soil areas within deteriorated plant communities due to long-term repeated disturbances. Club moss cover is often 25 percent or greater. Club moss creates a more arid microclimate, resulting in extreme competition for available moisture. Vigor and production of other species is reduced dramatically. Initial runoff rates are low but then increase as clubmoss becomes saturated. Once clubmoss has been saturated then runoff increases and infiltration decreases as compared HCPC. Soil erosion is minimal.

Grasses and grass-like plants include western wheatgrass, needleandthread, blue grama, upland sedges, and prairie junegrass. Forbs commonly found in the HCPC are found in this community. When compared to the Western Wheatgrass/Green Needlegrass Plant Community, blue grama and club moss have increased, while western wheatgrass and green needlegrass have decreased.

The following growth curve represents monthly percentages of total annual growth of the dominant species during a normal year.

Growth curve number: ND5404

Growth curve name: Missouri Slope, Warm-season Dominant, Cool-season Subdominant.

Growth curve description: Short warm-season dominant, mid cool-season subdominant & club moss.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	1	5	20	38	25	8	3	0	0	0

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

- Fertilization combined with prescribed grazing will move this plant community to the *Blue Grama/Western Wheatgrass Plant Community*, and subsequently through the successional stages leading toward the *Western Wheatgrass/Green Needlegrass Plant Community*.

- Mechanical renovation followed by prescribed grazing will reduce club moss, increase western wheatgrass, and eventually shift this plant community back toward the *Western Wheatgrass/Green Needlegrass Plant Community*.
- Prescribed burning, with sufficient amounts and continuity of fine fuels, will reduce club moss, and may eventually convert this plant community back to the *Western Wheatgrass/Green Needlegrass Plant Community*.
- Long-term prescribed grazing with adequate recovery periods following each grazing event and proper stocking over long periods of time move this plant community toward the *Blue Grama/Western Wheatgrass Plant Community*. It may eventually return to the *HCPC* or associated successional plant community stages assuming an adequate seed/vegetative source is available. This process may take greater than 20 years.

Annual/Pioneer Perennial Plant Community

This plant community develops under severe disturbance and/or excessive defoliation. This can result from heavy livestock or wildlife concentration, and cropping abandonment (go-back land). The dominant vegetation includes pioneer annual grasses, forbs, invaders, and early successional biennial and perennial species. Grasses may include red threeawn, six-weeks fescue, smooth brome, crested wheatgrass, annual brome, needleandthread, prairie Junegrass, and western wheatgrass. The dominant forbs include curlycup gumweed, maretail, salsify, kochia, field bindweed, thistles, western ragweed, pussytoes, prostrate verbena, and other early successional species. Shrubs that may be present include prairie rose, fringed sage, and broom snakeweed. Plant species from adjacent ecological sites may become minor components of this plant community. The community also is susceptible to invasion of Canada thistle and other non-native species due to severe soil disturbances and relatively high percent of bare ground. Compared to the *HCPC*, western wheatgrass, green needlegrass, porcupine grass, and blue grama have decreased. Many annual and perennial forbs, including non-native species, have invaded.

This plant community is resistant to change, as long as soil disturbance or severe vegetation defoliation persists, thus holding back secondary plant succession. Soil erosion is potentially high. Reduced surface cover, low plant density, low plant vigor, loss of root biomass, and soil compaction, all contribute to decreased water infiltration, increased runoff, and accelerated erosion rates. Significant economic inputs, management, and time would be required to move this plant community toward a higher successional stage and a more productive plant community. Secondary succession is highly variable, depending upon availability and diversity of a viable seed bank of higher successional species within the existing plant community and neighboring plant communities. This plant community can be renovated to improve the production capability, but management changes would be needed to maintain the new plant community. Total production is highly variable and can range from 400 to 1,400 lbs./ac. (air-dry weight) depending upon growing conditions.

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

- Under long-term prescribed grazing and/or removal of disturbance, including adequate rest periods, this plant community will move through the successional stages, and may eventually lead to the *Western Wheatgrass/Green Needlegrass Plant Community (HCPC)*. Depending on the slope, aspect, and size, and if adequate perennial plants exist, this change can occur more rapidly. This process will likely take a long period of time (50+ years).
- Heavy, continuous grazing may cause further deterioration resulting in a shift to the *Club Moss Plant Community*.
- Range seeding followed with prescribed grazing can be used to convert this plant community to one that may resemble the *HCPC*.

Ecological Site Interpretations

Animal Community – Wildlife Interpretations

Western Wheatgrass/Green Needlegrass Plant Community: The predominance of grasses plus high diversity of forbs and shrubs in this community favors grazers and mixed-feeders, such as bison, deer, and antelope. Large animal nutrition levels are relatively high year-long with the diversity of grasses, grasslikes, forbs, and shrubs. Suitable thermal cover for large herbivores may be limited due to the low quantities of shrubs. The complex plant structural diversity provides habitat for a wide array of small mammals and neotropical migratory birds. Sites adjacent to woody vegetative states may provide foraging and roosting areas for sharp-tailed grouse, as well as potential lek sites. Many small mammals would occur here, including coyote, badger, ground squirrels, and jackrabbit. Diverse prey populations are available for raptors such as ferruginous hawk, prairie falcon, golden eagle, and swainson's hawk. The mix of grass stature along with scattered shrubs and a variety of forbs provide habitat for many bird species including the western meadowlark, bobolink, baird's sparrow, savannah sparrow, and chestnut-collared longspur.

Blue Grama/Western Wheatgrass Plant Community: The loss of structural diversity makes this plant community somewhat less attractive to the diverse wildlife species using the Western Wheatgrass/Green Needlegrass Plant Community. This plant community provides limited foraging for antelope and deer due to loss of production. A decrease in residual plant material and litter cover makes this community less attractive for ground-nesting birds. Some prairie bird species, such as lark bunting, grasshopper sparrow, upland sandpiper, and marbled godwit, will benefit from the low structure as foraging sites. Some small mammals such as ground squirrels and fox would benefit from the reduced cover. Upland game-bird habitat quality would be less desirable than the HCPC due to less escape cover. Generally, this plant community is not a target for wildlife habitat management.

Excessive Litter Plant Community: The lack of diversity among plant species subsequently results in lack of diversity among animal species. Abundant litter accumulations favor rodent populations, such as field mice, and their predator species, such as coyotes, raptors, and snakes. The increase in shrub stands will provide concealment cover from predators for a number of wildlife species including upland game birds, new-born deer fawn, and antelope kids. The community may be used for roosting or bedding areas by some birds and larger ungulates in association with their primary habitat. Bird species that are attracted to high ground cover and abundant litter would benefit such as bobolink, western meadowlark, and northern harrier.

Club Moss Plant Community: This vegetative state, dominated by clubmoss ground cover, offers limited cover for larger prairie mammals and upland game birds. Club moss further limits production of higher forms of vegetation and the community exhibits low plant diversity and short structure. It may be important in providing lek sites when adjacent to sagebrush stands for sage grouse or adjacent to other communities for sharp-tailed grouse. Some birds of prey may find easier foraging due to cover conditions that make prey more vulnerable, but this site supports a much lower prey base. Some short grass prairie bird species such as killdeer, horned lark, cowbird, chestnut-collared longspur will benefit from the open cover and low growth forms. It is somewhat similar to the Blue Grama/Western Wheatgrass Plant Community in regard to wildlife suitability.

Annual/Pioneer Perennial: Sparse vegetation and greater coverage of bare ground provides suitable habitat for killdeer, horned larks, lark buntings, and cowbirds. This plant community is beneficial to species, such as the prairie dog and ground squirrel, which have low vegetative cover requirements. Other wildlife species, such as the burrowing owl, prairie rattlesnake, and black-footed ferret, benefit from the subterranean structures created by the burrowing animals. Many native

grassland wildlife species are directly or indirectly reliant on prairie dog habitat. Such habitat plays an important role in the overall functioning of the prairie ecosystem.

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

Common Name	Cattle	Sheep	Horses	Deer	Antelope	Bison	Elk
Grasses & Grass-likes							
bearded wheatgrass	U P U U	N D U N	U P U U	N D U N	N D U N	U P U U	U P U U
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
crested wheatgrass	U P U D	U P N N	U P U D	U P N N	U P N N	U P U D	U P U D
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
Kentucky bluegrass	U D U U	U P N D	U D U U	U P N D	U P N D	U D U U	U D U 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 reedgrass	U D U U	N D N N	U D U U	N D N N	N D N N	U D U U	U D U 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 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
red 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
Sandberg bluegrass	N U N N	N D N N	N U N N	N D N N	N D N N	N U N N	N U N N
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
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
smooth bromegrass	U P U U	U P U U	U P U U	U P U U	U P U U	U P U U	U P U U
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							
American vetch	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
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
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
groundplum milkvetch	U D U U	U D D U	U D U U	U D D U	U D D U	U D U U	U D D 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
Missouri 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
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
prairie smoke	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
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
purple prairie clover	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
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 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
silverleaf 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
western yarrow	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
wild onion	U D U U	U D D U	U D U U	U D D U	U D D U	U D U U	U D D U
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
prairie 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
silver sagebrush	D U U D	D U U D	D U U D	P D D P	P P P P	D U U D	D U U D
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
winterfat	P P P P	P P P P	P P P P	P P P P	P P P P	P P P P	P P P P

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 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 recommended*. These are conservative estimates that should be used only as

guidelines in the initial stages of the conservation planning process and may need to be adjusted due to diet preferences of other types or kinds of livestock and/or other factors. 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. With consultation of the land manager, more intensive grazing management may result in improved harvest efficiencies and increased carrying capacity.

Plant Community	Production (lbs./acre)	Carrying Capacity¹ (AUM/acre)
Western Wheatgrass/Green Needlegrass (HCPC)	2400	0.76
Blue Grama/Western Wheatgrass	700	0.22
Clubmoss	600	0.19
Excessive Litter	2200	0.69 ²
Annual/Pioneer Perennial	-- ³	-- ³

¹ Continuous season-long grazing by cattle under average growing conditions.

² Stocking rates may need to be adjusted due to palatability and/or availability of forage.

³ Highly variable; stocking rate needs to be determined onsite.

Hydrology Functions

Water is the principal factor limiting herbage production on this site. The site is dominated by soils in hydrologic groups B, with localized areas in hydrologic group C. Infiltration varies from moderately slow to moderately rapid and runoff potential varies from negligible to high for this site depending on soil hydrologic group 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 exception would be where shortgrasses form a dense 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).

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

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

Supporting Information

Associated Sites

(054XY020ND) – Clayey (054XY041ND) – Loamy Terrace (054XY033ND) – Thin Claypan
 (054XY021ND) – Claypan (054XY026ND) – Sandy (054XY038ND) – Thin Loamy
 (054XY023ND) – Loamy Overflow (054XY030ND) – Shallow Loamy

Similar Sites

(054XY020ND) – Clayey (Cy)

[Does not receive additional moisture. Found on dry uplands, upslope from loamy or clayey terraces or loamy overflow sites, down slope from thin loamy, shallow loamy or shallow clayey sites. Similar landscape position as sandy, sands, and loamy sites. Will ribbon greater than two inches. Indicator species: dominated by of western wheatgrass and green needlegrass. This site has more green needlegrass and western wheatgrass, similar production, similar landscape position, different soil texture.]

(054XY021ND) – Claypan (Cp)

[Well drained soils on uplands or terraces that don't receive extra moisture with a dense sodic subsoil below 6 inches with salts below 16 inches. Indicator species are western wheatgrass with an understory of blue grama, heath aster, and western yarrow along with a few shrubs of fringed sagewort and Nuttall's Saltbush. This site has less production, less green needlegrass and shrubs, more blue grama, and a dense sodic subsoils layer above 20 inches.]

(054XY041ND) – Loamy Terrace (LyT)

[Well drained soils on a river or stream terrace in a position that will flood occasionally (once in 10 years) with no apparent water table. Down slope from loamy, sandy, clayey, and sands, and upslope form subirrigated ecological sites. Indicator species are western wheatgrass evenly mixed with green needlegrass, American vetch, and western snowberry or silver sagebrush, and with possible trees. This site has less western wheatgrass and blue grama, more green needlegrass and big bluestem, more productions and different landscape position that receives extra moisture due to occasional flooding.]

(054XY026ND) – Sandy (Sy)

[Does not receive additional moisture. Found on dry uplands upslope from sandy terraces or loamy overflow sites, down slope from limy sands or shallow sandy sites. Similar landscape position as loamy, sands, clayey sites; will ribbon up to one inch. Indicator species are prairie sandreed with western wheatgrass and green needlegrass intermixed. This site has prairie sandreed and sand bluestem; more needleandthread and sedges, less blue grama, green needlegrass, and western wheatgrass, similar production, similar landscape position, different soil texture.]

(054XY030ND) – Shallow Loamy (SwLy)

[Well drained soils more than 10 less than 20 inches to sedimentary bedrock that restricts root penetration. Surface layer will ribbon less than two inches and greater than one inch. Upslope from thin loamy or loamy sites and some times down slope form very shallow ecological sites. Indicator species: little bluestem, plains muhly, needle grasses and sideoats grama, with dotted gayfeather, pasqueflower, purple coneflower, and purple prairie clover, and shrubs like broom snakeweed. This site has less production, different landscape position, a restrictive layer above 20 inches, more little bluestem, plains muhly, and sideoats grama, less western wheatgrass, and green needlegrass.]

Site Type: Rangeland
MLRA: 54 – Rolling Soft Shale Plain
(054XY038ND) – Thin Loamy (TLy)

Loamy
R054XY031ND

[Deep and moderately deep soils, usually calcareous within four inches to the surface, found on knobs and/or sideslopes of hills and buttes. Will form a ribbon greater than one inch but not more than two inches. Up slope of loamy and down slope of shallow loamy ecological sites. Indicator species: western wheatgrass, little bluestem, plains muhly, porcupinegrass, and sideoats grama, with Missouri goldenrod, dotted gayfeather, pasqueflower, purple coneflower and purple prairie clover, and shrubs like winterfat and prairie rose. This site has less production, thin "A" horizon, no mollic epipedon, lime within six inches to the surface, more little bluestem, porcupinegrass, plains muhly, sideoats grama, less western wheatgrass and green needlegrass, different landscape positions.]

Inventory Data References

Information presented here has been derived from NRCS clipping and other inventory data. Also, field knowledge of range-trained personnel was used. All descriptions were peer reviewed and/or field-tested by various private, state, and federal agency specialists. Those involved in developing this site description include: Dennis Froemke, NRCS Range Management Specialist; Jeff Printz, NRCS State Range Management Specialist; Stan Boltz, NRCS Range Management Specialist; Darrell Vanderbusch, NRCS Resource Soil Scientist; L. Michael Stirling, NRCS Range Management Specialist; Dean Chamrad, NRCS State Range Management Specialist; Josh Saunders, NRCS Range Management Specialist; Kevin Sedivec, Extension Rangeland Management Specialist; Michael D. Brand, State Land Dept. Director Surface Management; David Dewald, NRCS State Biologist; and Brad Podoll, NRCS Biologist.

<u>Data Source</u>	<u>Number of Records</u>	<u>Sample Period</u>	<u>State</u>	<u>County</u>
SCS-RANGE-417	27	1968 – 1986	ND; SD	Adams, Emmons, Grant, Hettinger, Slope, Perkins

State Correlation

This site has been correlated with Montana and South Dakota in MLRA 54.

Field Offices

Baker, MT	Buffalo, SD	Faith, SD	Mott, ND
Beach, ND	Carson, ND	Hettinger, ND	Selfridge, ND
Beulah, ND	Culbertson, MT	Killdeer, ND	Sidney, MT
Bison, SD	Dickinson, ND	Mandan, ND	Watford City, ND
Bowman, ND	Dupree, SD	McIntosh, SD	Wibaux, MT

Relationship to Other Established Classifications

Level IV Ecoregions of the Conterminous United States: 43a – Missouri Plateau.

Other References

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

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

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

Site Type: Rangeland
MLRA: 54 – Rolling Soft Shale Plain

Loamy
R054XY031ND

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. 2001. The PLANTS Database, Version 3.1 (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

USDA, NRCS, Various Published Soil Surveys.

Site Description Approval

State Range Management Specialist Date

State Range Management Specialist Date

State Range Management Specialist Date