

## United States Department of Agriculture Natural Resources Conservation Service

### Ecological Site Description

**Site Name:** Claypan

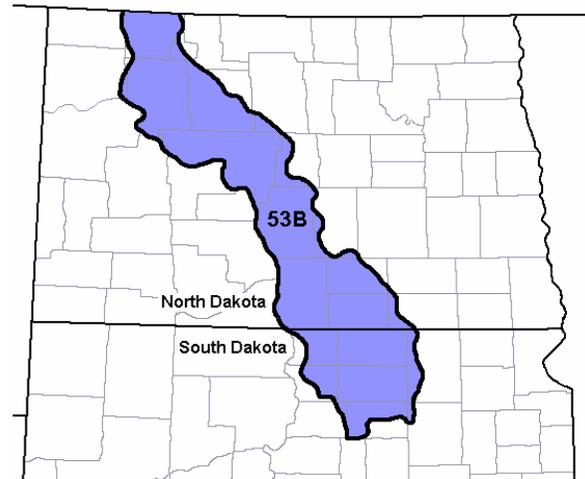
**Site Type:** Rangeland

**Site ID:** R053BY002ND

**Major Land Resource Area (MLRA):** 53B – Central Dark Brown Glaciated Plains

For more information on MLRA's, refer to the following Web site:

[http://www.soilinfo.psu.edu/soil\\_lrr/](http://www.soilinfo.psu.edu/soil_lrr/).



### Physiographic Features

This site occurs on gently undulating to rolling residual uplands.

**Landform:** lake plain, till plain, swale

**Aspect:** NA

	<u>Minimum</u>	<u>Maximum</u>
<b>Elevation (feet):</b>	1600	2000
<b>Slope (percent):</b>	0	9
<b>Water Table Depth (inches):</b>	42	80
<b>Flooding:</b>		
<b>Frequency:</b>	None	None
<b>Duration:</b>	None	None
<b>Ponding:</b>		
<b>Depth (inches):</b>	None	None
<b>Frequency:</b>	None	None
<b>Duration:</b>	None	None
<b>Runoff Class:</b>	Medium	Very high

### Climatic Features

MLRA 53B 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 15 to 20 inches per year. The normal average annual temperature is about 41°F. January is the coldest month with average temperatures ranging from about 4°F (Powers Lake, North Dakota (ND)), to about 10°F (Pollock, South Dakota (SD)). July is the warmest month with temperatures averaging from about 67°F (Powers Lake, ND), to about 72°F (Pollock, SD). The range of normal average monthly temperatures between the coldest and warmest months is about

62°F. This large annual range attests to the continental nature of this MLRA's climate. Winds 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>
<b>Frost-free period (days):</b>	110	135
<b>Freeze-free period (days):</b>	129	156
<b>Mean Annual Precipitation (inches):</b>	15	20

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

	Precip. Min.	Precip. Max	Temp. Min.	Temp. Max.
January	0.41	0.48	-6.8	21.5
February	0.41	0.57	0.7	28.9
March	0.57	1.09	12.0	39.7
April	1.31	2.01	27.0	57.4
May	1.98	2.92	38.6	70.8
June	3.17	3.80	48.4	79.3
July	2.38	2.84	52.9	86.2
August	1.82	2.17	50.8	85.6
September	1.37	1.67	39.9	74.2
October	0.62	1.30	28.3	61.2
November	0.53	0.74	13.7	41.2
December	0.43	0.43	0.3	27.2

Climate Stations		Period	
Station ID	Location or Name	From	To
ND3376	Garrison 1 NNW	1948	2001
SD4891	Leola	1948	2001
ND6383	New Town 4 W	1952	1985
SD6712	Pollock	1948	2001
ND7281	Powers Lake	1948	2001
SD7277	Roscoe	1948	2001

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**

These are moderately deep to very deep, moderately well and well drained soils. Saturated hydraulic conductivity is moderately slow to very slow and available water capacity is moderate. They have moderately coarse to moderately fine textured surface layers underlain by a sodic subsoil. The subsoils are moderately fine to fine textured and are high in sodium. These dense sodic subsoils restrict root growth. Salinity is moderate to strong at depths greater than 16 inches. This site is on

nearly level to undulating lake plains, till plains, and swales. Slope ranges from 0 to 9 percent. This site should show slight to no evidence of rills, wind scoured areas, or pedestalled 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.

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:

<http://www.nrcs.usda.gov/technical/efotg/>.

**Parent Material Kind:** alluvium, residuum, glaciolacustrine deposits

**Parent Material Origin:** shale, siltstone, sandstone

**Surface Texture:** loam, silty clay loam

**Surface Texture Modifier:** none

**Subsurface Texture Group:** clayey

**Surface Fragments ≤3" (% Cover):** 0-10

**Surface Fragments >3" (%Cover):** 0-1

**Subsurface Fragments ≤3" (% Volume):** 0-15

**Subsurface Fragments >3" (% Volume):** 0-5

	<u>Minimum</u>	<u>Maximum</u>
<b>Drainage Class:</b>	moderately well	well
<b>Permeability Class:</b>	very slow	moderately slow
<b>Depth to first restrictive layer (inches):</b>	8	24
<b>Electrical Conductivity (mmhos/cm)*:</b>	0	16
<b>Sodium Absorption Ratio*:</b>	0	25
<b>Soil Reaction (1:1 Water)*:</b>	5.6	9
<b>Soil Reaction (0.1M CaCl<sub>2</sub>)*:</b>	NA	NA
<b>Available Water Capacity (inches)*:</b>	2	5
<b>Calcium Carbonate Equivalent (percent)*:</b>	0	30

\* - 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 management actions and/or climatic conditions. Due to the nature of the soils, the site is considered quite fragile. Under continued adverse impacts, a rapid decline in vegetative vigor and composition will occur. Under favorable vegetative management treatments the site can slowly 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.

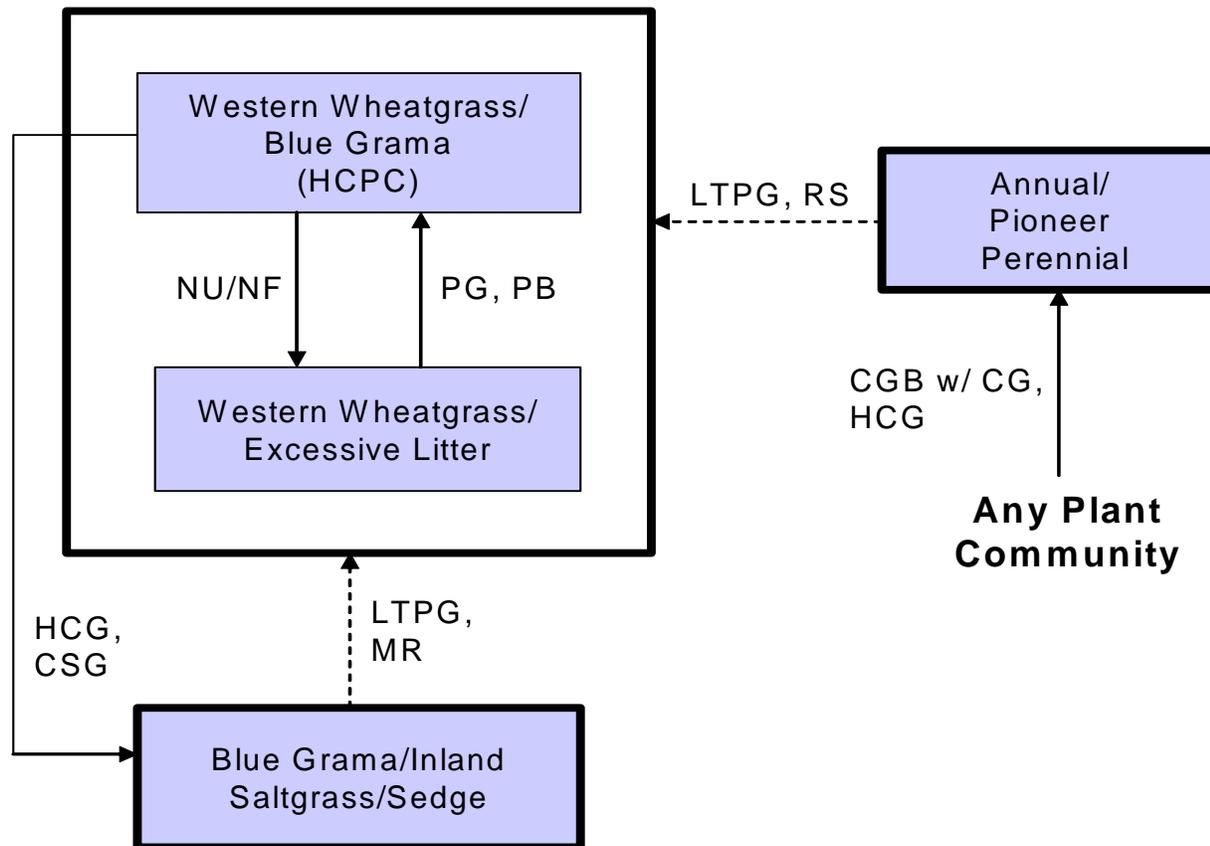
Heavy continuous grazing and/or continuous seasonal (spring) grazing, without adequate recovery periods following each grazing occurrence causes this site to depart from the HCPC. Blue grama and buffalograss will begin to increase. Western wheatgrass will increase initially and then begin to decrease. Green needlegrass will decrease in frequency and production. In time, heavy continuous

grazing will likely cause blue grama and buffalograss to dominate and pioneer perennials and annuals to increase.

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.

The following diagram illustrates the common plant communities and vegetation states commonly occurring on the site and the transition pathways between communities and states. 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; **HCG** – Heavy continuous grazing; **HCPC** – Historic Climax Plant Community; **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; **RS** – Range seeding with prescribed grazing.

### Plant Community Composition and Group Annual Production

COMMON/GROUP NAME		SYMBOL	Western Wheatgrass/ Blue Grama (HCPC)		
			Group	lbs./acre	% Comp
<b>GRASSES &amp; GRASS-LIKES</b>				1360 - 1530	80 - 90
			<b>1</b>	<b>340 - 510</b>	<b>20 - 30</b>
western wheatgrass	PASM	1	340 - 510	20 - 30	
thickspike wheatgrass	ELLAL	1	0 - 85	0 - 5	
			<b>2</b>	<b>170 - 255</b>	<b>10 - 15</b>
blue grama	BOGR2	2	170 - 255	10 - 15	
buffalograss	BUDA	2	0 - 85	0 - 5	
			<b>3</b>	<b>85 - 306</b>	<b>5 - 18</b>
green needlegrass	NAVI4	3	85 - 255	5 - 15	
needleandthread	HECOC8	3	17 - 85	1 - 5	
porcupine grass	HESP11	3	0 - 85	0 - 5	
<b>OTHER NATIVE PERENNIALS</b>			<b>4</b>	<b>85 - 204</b>	<b>5 - 12</b>
prairie junegrass	KOMA	4	34 - 85	2 - 5	
inland saltgrass	DISP	4	17 - 51	1 - 3	
Sandberg bluegrass	POSE	3	34 - 85	2 - 5	
other perennial grasses	2GP	4	17 - 85	1 - 5	
<b>GRASS-LIKES</b>			<b>5</b>	<b>34 - 170</b>	<b>2 - 10</b>
needleleaf sedge	CADU6	5	34 - 170	2 - 10	
Penn sedge	CAPE6	5	17 - 85	1 - 5	
other grass-likes	2GL	5	0 - 85	0 - 5	
<b>FORBS</b>			<b>6</b>	<b>85 - 170</b>	<b>5 - 10</b>
cudweed sagewort	ARLU	6	17 - 34	1 - 2	
heath aster	SYER	6	17 - 34	1 - 2	
goldenrod	SOLID	6	17 - 34	1 - 2	
Nuttall's violet	VINU2	6	0 - 17	0 - 1	
prairie coneflower	RACO3	6	17 - 34	1 - 2	
rose pussytoes	ANRO2	6	0 - 17	0 - 1	
rush skeletonweed	LYJU	6	17 - 34	1 - 2	
scarlet globemallow	SPCO	6	17 - 34	1 - 2	
scurfpea	PSORA2	6	17 - 34	1 - 2	
wavyleaf thistle	CIUN	6	0 - 17	0 - 1	
western yarrow	ACMI2	6	17 - 34	1 - 2	
wild onion	ALLIU	6	0 - 17	0 - 1	
wild parsley	MUDI	6	0 - 17	0 - 1	
woolly Indianwheat	PLPA2	6	0 - 17	0 - 1	
native annual/biennial forbs	2FORB	6	0 - 34	0 - 2	
native perennial forbs	2FP	6	0 - 34	0 - 2	
<b>SHRUBS</b>			<b>7</b>	<b>17 - 85</b>	<b>1 - 5</b>
brittle cactus	OPFR	7	0 - 17	0 - 1	
broom snakeweed	GUSA2	7	17 - 34	1 - 2	
fringed sagewort	ARFR4	7	17 - 34	1 - 2	
plains pricklypear	OPPO	7	0 - 17	0 - 1	
purple pincushion	ESVIV	7	0 - 17	0 - 1	
rose	ROSA5	7	17 - 34	1 - 2	
other shrubs	2SHRUB	7	0 - 34	0 - 2	
<b>Annual Production lbs./acre</b>			<b>LOW</b>	<b>RV</b>	<b>HIGH</b>
<b>GRASSES &amp; GRASS-LIKES</b>			1105 -	1522	-1935
<b>FORBS</b>			80 -	128	-175
<b>SHRUBS</b>			15 -	51	-90
<b>TOTAL</b>			1200 -	1700	-2200

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/ Blue Grama (HCPC)			Western Wheatgrass/ Excessive Litter			Blue Grama/Inland Saltgrass/Sedge		
		Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp	Grp	lbs./acre	% Comp
<b>GRASSES &amp; GRASS-LIKES</b>			1445 - 1615	85 - 95		1050 - 1190	75 - 85		765 - 855	85 - 95
<b>WHEATGRASSES</b>		1	340 - 510	20 - 30	1	70 - 210	5 - 15	1	18 - 90	2 - 10
western wheatgrass	PASM	1	340 - 510	20 - 30	1	70 - 210	5 - 15	1	18 - 90	2 - 10
slender wheatgrass	ELTR7	1	34 - 170	2 - 10	1	0 - 70	0 - 5			
thickspike wheatgrass	ELLAL	1	0 - 85	0 - 5	1	0 - 70	0 - 5	1	0 - 45	0 - 5
<b>SHORT WARM-SEASON GRASSES</b>		2	170 - 255	10 - 15	2	14 - 70	1 - 5	2	135 - 270	15 - 30
blue grama	BOGR2	2	170 - 255	10 - 15	2	14 - 70	1 - 5	2	90 - 270	10 - 30
buffalograss	BUDA	2	0 - 85	0 - 5	2	14 - 70	1 - 5	2	45 - 135	5 - 15
<b>NEEDLEGRASSES</b>		3	85 - 306	5 - 18	3	42 - 140	3 - 10	3	0 - 45	0 - 5
green needlegrass	NAVI4	3	85 - 255	5 - 15	3	28 - 112	2 - 8	3	0 - 27	0 - 3
needleandthread	HECOC8	3	17 - 85	1 - 5	3	14 - 70	1 - 5	3	0 - 18	0 - 2
porcupine grass	HESP11	3	0 - 85	0 - 5	3	14 - 70	1 - 5			
<b>OTHER NATIVE PERENNIALS</b>		4	85 - 204	5 - 12	4	28 - 70	2 - 5	4	45 - 135	5 - 15
prairie junegrass	KOMA	4	34 - 85	2 - 5	4	14 - 56	1 - 4	4	9 - 27	1 - 3
inland saltgrass	DISP	4	17 - 51	1 - 3	4	0 - 42	0 - 3	4	27 - 90	3 - 10
Sandberg bluegrass	POSE	4	34 - 85	2 - 5	4	14 - 56	1 - 4	4	18 - 72	2 - 8
other perennial grasses	2GP	4	17 - 85	1 - 5	4	14 - 70	1 - 5	4	9 - 45	1 - 5
<b>GRASS-LIKES</b>		5	34 - 170	2 - 10	5	28 - 70	2 - 5	5	45 - 135	5 - 15
needleleaf sedge	CADU6	5	34 - 170	2 - 10	5	14 - 70	1 - 5	5	45 - 135	5 - 15
Penn sedge	CAPE6	5	17 - 85	1 - 5	5	14 - 42	1 - 3	5	18 - 72	2 - 8
other grass-likes	2GL	5	0 - 85	0 - 5	5	0 - 56	0 - 4	5	0 - 45	0 - 5
<b>NON-NATIVE GRASSES</b>		6			6	210 - 490	15 - 35	6	18 - 90	2 - 10
bluegrass	POA				6	70 - 420	5 - 30	6	18 - 90	2 - 10
smooth bromegrass	BRIN2				6	70 - 420	5 - 30	6	0 - 36	0 - 4
crested wheatgrass	AGCR				6	0 - 210	0 - 15	6	0 - 36	0 - 4
cheatgrass	BRTE				6	70 - 280	5 - 20	6	18 - 90	2 - 10
<b>FORBS</b>		7	85 - 170	5 - 10	7	70 - 210	5 - 15	7	45 - 90	5 - 10
cudweed sagewort	ARLU	7	17 - 34	1 - 2	7	14 - 56	1 - 4	7	18 - 72	2 - 8
curlycup gumweed	GRSQ				7	14 - 42	1 - 3	7	9 - 27	1 - 3
heath aster	SYER	7	17 - 34	1 - 2	7	14 - 70	1 - 5	7	9 - 27	1 - 3
goldenrod	SOLID	7	17 - 34	1 - 2	7	14 - 56	1 - 4	7	9 - 27	1 - 3
Nuttall's violet	VINU2	7	0 - 17	0 - 1						
prairie coneflower	RACO3	7	17 - 34	1 - 2	7	14 - 28	1 - 2	7	0 - 9	0 - 1
rose pussytoes	ANRO2	7	0 - 17	0 - 1				7	0 - 9	0 - 1
rush skeletonweed	LYJU	7	17 - 34	1 - 2	7	14 - 28	1 - 2	7	0 - 9	0 - 1
scarlet globemallow	SPCO	7	17 - 34	1 - 2	7	14 - 28	1 - 2	7	0 - 18	0 - 2
scurfpea	PSORA2	7	17 - 34	1 - 2	7	14 - 42	1 - 3	7	0 - 18	0 - 2
wavyleaf thistle	CIUN	7	0 - 17	0 - 1	7	0 - 28	0 - 2	7	0 - 18	0 - 2
western salsify	TRDU				7	14 - 56	1 - 4	7	9 - 27	1 - 3
western yarrow	ACMIO	7	17 - 34	1 - 2	7	14 - 28	1 - 2	7	9 - 18	1 - 2
wild onion	ALLIU	7	0 - 17	0 - 1	7	0 - 14	0 - 1			
wild parsley	MUDI	7	0 - 17	0 - 1						
woolly Indianwheat	PLPA2	7	0 - 17	0 - 1	7	0 - 14	0 - 1	7	0 - 18	0 - 2
native annual/biennial forbs	2FORB	7	0 - 34	0 - 2	7	0 - 42	0 - 3	7	0 - 18	0 - 2
native perennial forbs	2FP	7	0 - 34	0 - 2	7	0 - 42	0 - 3	7	0 - 18	0 - 2
non-native forbs	2FORB				7	14 - 70	1 - 5	7	0 - 27	0 - 3
<b>SHRUBS</b>		8	17 - 85	1 - 5	8	28 - 140	2 - 10	8	9 - 45	1 - 5
brittle cactus	OPFR	8	0 - 17	0 - 1	8	0 - 28	0 - 2	8	0 - 36	0 - 4
broom snakeweed	GUSA2	8	17 - 34	1 - 2	8	14 - 70	1 - 5	8	0 - 36	0 - 4
fringed sagewort	ARFR4	8	17 - 34	1 - 2	8	14 - 70	1 - 5	8	9 - 45	1 - 5
plains pricklypear	OPPO	8	0 - 17	0 - 1	8	0 - 28	0 - 2	8	0 - 27	0 - 3
purple pincushion	ESVIV	8	0 - 17	0 - 1	8	0 - 14	0 - 1	8	0 - 9	0 - 1
rose	ROSA5	8	17 - 34	1 - 2	8	14 - 42	1 - 3	8	9 - 27	1 - 3
other shrubs	2SHRUB	8	0 - 34	0 - 2	8	0 - 42	0 - 3	8	0 - 18	0 - 2
<b>Annual Production lbs./acre</b>			LOW RV HIGH		LOW RV HIGH		LOW RV HIGH		LOW RV HIGH	
<b>GRASSES &amp; GRASS-LIKES</b>			1105 - 1522 - 1935		910 - 1176 - 1440		455 - 806 - 1055			
<b>FORBS</b>			80 - 128 - 175		65 - 140 - 215		40 - 68 - 95			
<b>SHRUBS</b>			15 - 51 - 90		25 - 84 - 145		5 - 27 - 50			
<b>TOTAL</b>			1200 - 1700 - 2200		1000 - 1400 - 1800		500 - 900 - 1200			

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 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/Blue Grama 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. Cool-season grasses dominate the site, but warm-season short grasses are also prevalent. Western wheatgrass is the dominant grass. Other grasses and grass-like plants occurring on the site include blue grama, needleandthread, buffalograss, green needlegrass, Sandberg bluegrass, inland Saltgrass, and sedges. Significant forbs include silverleaf scurpea, cudweed sagewort, and heath aster. Shrubs present include brittle cactus, plains pricklypear, fringed sagewort, and rose.

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. Good vegetative cover coupled with moderate available water capacity provides for 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: ND5303

Growth curve name: Missouri Coteau, cool-season/warm-season co-dominant.

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

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	2	6	21	40	20	6	4	1	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 *Western Wheatgrass/Excessive Litter Plant Community*.
- Heavy, continuous grazing or continuous seasonal grazing (annual, early spring) will convert the plant community to the *Blue Grama/Inland Saltgrass/Sedge Plant Community*. Further

deterioration of this plant community due to grazing may result in the *Annual/Pioneer Perennial Plant Community*.

- Go-back land with continuous grazing will convert this plant community to the *Annual/Pioneer Perennial Plant Community*.

### Blue Grama/Inland Saltgrass/Sedge Plant Community

This plant community can quickly result from heavy continuous grazing and/or annual, early spring seasonal grazing. Annual grazing too early in the spring depletes stored carbohydrates, resulting in weakening and eventual death of the cool-season mid-grasses. Short grasses and forbs increase to dominate the plant community and annual production decreases dramatically. Lack of litter and reduced plant vigor result in higher soil temperatures, high evapotranspiration, and poor water infiltration rates, which gives blue grama a competitive advantage over cool-season mid-grasses. This plant community can occur throughout the pasture, on spot grazed areas, and around water sources where season-long grazing patterns occur.

Blue grama and Sandberg bluegrass are the prominent species with the balance being a few species of cool-season grasses and warm-season grasses including buffalograss, inland saltgrass, prairie Junegrass, and needleandthread. Forbs and shrubs such as fringed sagewort, cudweed sagewort, heath aster, and western yarrow may also be present. There is usually less than 10 percent bare ground.

This plant community is relatively stable. 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.

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: ND5304

Growth curve name: Missouri Coteau, warm-season dominant, cool-season sub-dominant.

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

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:

- Long-term prescribed grazing that includes changing season of use and allowing adequate recovery periods to enhance cool-season grasses can slowly shift this plant community back towards the *Western Wheatgrass/Blue Grama Plant Community (HCPC)*.
- Mechanical treatments such as chiseling, or range seeding, followed by prescribed grazing are aggressive measures to accelerate a transition leading to a plant community, which closely resembles the *Western Wheatgrass/Blue Grama Plant Community (HCPC)*.
- Heavy, continuous grazing may cause further deterioration resulting in a shift to the *Annual/Pioneer Perennial Plant Community*.
- Go-back land with continuous grazing will convert this plant community to the *Annual/Pioneer Perennial Plant Community*.

### Western Wheatgrass/Excessive Litter Plant Community

This plant community develops after an extended period of 15 years or more of non-use by herbivores and exclusion of fire. 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. Plant litter accumulates in large amounts as this community develops. Litter buildup reduces plant vigor and density, and seedling recruitment declines. Eventually, litter levels become abundant enough to crowd out living plants and reduce plant density. Annual and/or biennial forbs, annual grasses, and cryptogams commonly fill these interspaces. Due to a lack of tiller stimulation and sunlight, native bunchgrasses typically develop dead centers and native rhizomatous grasses are limited to small colonies. Heavy litter covers shorter understory species (i.e., short grasses and sedges) restricting their ability to capture adequate sunlight for photosynthesis. Vigor and diversity of native plants are reduced.

Non-native grasses, such as Kentucky bluegrass, crested wheatgrass, and smooth brome grass tend to invade and may dominate this plant community. Other grasses present include western wheatgrass, thickspike wheatgrass, needleandthread, and Sandberg bluegrass. The common forbs include sweetclover, cudweed sagewort, and western yarrow. Brittle cactus is the principal shrub.

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. Compared to the HCPC, infiltration is reduced to the lower root zone. Runoff is similar to the HCPC. This plant community tends to be moisture loving and usually tends to utilize the spring moisture quickly causing forage base to become dry and not very palatable early in the summer. Once this plant community is reached, time and external resources will be needed to see any immediate recovery in the diversity of the site.

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: ND5301

Growth curve name: Missouri Coteau, cool-season dominant.

Growth curve description: Cool-season 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:

- Prescribed grazing or prescribed burning followed by prescribed grazing will move this plant community toward the *Western Wheatgrass/Blue Grama Plant Community (HCPC)*. This would require long-term management with prescribed grazing and/or prescribed burning under controlled conditions.
- Heavy, continuous grazing may shift this plant community to the *Annual/Pioneer Perennial Plant Community*.
- Go-back land with continuous grazing will convert this plant community to the *Annual/Pioneer Perennial Plant Community*.

### 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 sixweeks fescue, smooth brome grass, crested wheatgrass, annual brome grass, 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 fringed sagewort 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 non-native annual and perennial forbs due to severe soil disturbances and relatively high percent of bare ground. Compared to the HCPC, western wheatgrass, thickspike wheatgrass, green needlegrass, needleandthread, and blue grama have decreased.

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. The total annual production ranges from 200 to 1,000 lbs./ac. (air-dry weight) depending upon growing conditions.

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

- Range seeding with deferment and prescribed grazing can convert this to a plant community resembling the *Western Wheatgrass/Blue Grama Plant Community*.
- 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/Blue Grama 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).

## **Ecological Site Interpretations**

### **Animal Community – Wildlife Interpretations**

-- Under Development --

**Western Wheatgrass/Blue Grama Plant Community:**

**Blue Grama/Inland Saltgrass/Sedge Plant Community:**

**Western Wheatgrass/Excessive Litter Plant Community:**

**Annual/Pioneer Perennial Plant Community:**

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

Common Name	Cattle	Sheep	Horses	Deer	Antelope	Bison	Elk
<b>Grasses &amp; Grass-likes</b>							
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
inland saltgrass	N U U N	N N N N	N U U N	N N N N	N N N N	N U U N	N U U N
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
needleleaf 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
Penn sedge	U P U D	U P N D	U P U D	U D U D	U D U D	U P U D	U P U D
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
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
thickspike wheatgrass	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
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
<b>Forbs</b>							
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
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
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
Nuttall's violet	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
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
rose 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 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
wavyleaf thistle	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
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
wild parsley	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
woolly Indianwheat	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
<b>Shrubs</b>							
brittle cactus	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
broom snakeweed	N N N N	U U U U	N N N N	U U U U	U U U U	N N N N	U U U U
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
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
purple pincushion	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

**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

### Hydrology Functions

Water is the principal factor limiting herbage production on this site. The site is dominated by soils in hydrologic group D. Infiltration varies from moderate to slow and runoff potential varies from medium to very high depending on soil hydrologic group, slope and ground cover. Usually areas with greater than 75 percent ground cover have the greatest potential for high infiltration and lower runoff. An exception would be where short grasses 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 many 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

- |                                  |                               |
|----------------------------------|-------------------------------|
| (053BY001ND) – Clayey            | (053BY006ND) – Saline Lowland |
| (053BY003ND) – Closed Depression | (053BY013ND) – Thin Claypan   |
| (053BY011ND) – Loamy             |                               |

### Similar Sites

- (053BY001ND) – Clayey (Cy)  
[Does not receive additional moisture. Found on dry uplands, upslope from Loamy Terrace or Loamy Overflow sites, down slope from Thin Loamy or Shallow Loamy sites. Similar landscape position as Sandy, Sands, and Loamy sites. Will ribbon greater than two inches. Indicator species: dominated by western wheatgrass and green needlegrass. This site has more production, more green needlegrass, less blue grama, deeper soils, no sodic subsoil layer.]
- (053BY003ND) – Closed Depression (Cd)  
[Poorly drained clayey soils with sodic subsoils and with redoximorphic features within depressions. Ponds periodically with no apparent water table. Indicator species: dominated by western wheatgrass with alkaligrass and foxtail barley intermixed, forb indicator is western dock, no shrubs. This site has more production, more western wheatgrass but no blue grama.]
- (053BY011ND) – Loamy (Lo)  
[Does not receive additional moisture. Found on dry uplands upslope from Loamy terrace or Loamy Overflow sites, down slope from Thin Loamy or

Shallow Loamy sites; similar landscape position as Sandy, Sands, Clayey sites. Will ribbon greater than one inch and up to two inches. Indicator species: western wheatgrass, green needlegrass, and blue grama, with fringed sagewort and western snowberry being the dominant shrubs. This site has more production, more green needlegrass and shrubs, less blue grama, deeper soils, no sodic subsoil layer.]

(053BY013ND) – Thin Claypan (TCp)

[Well drained soils on uplands or terraces that don't receive extra moisture with a dense sodic subsoil above 6 inches and with salts above 16 inches restricting root penetration. Usually found in micro relief within Claypan sites, indicator species are western wheatgrass, Sandberg's bluegrass with an understory of blue grama and buffalograss, heath aster, cudweed sagewort, and western yarrow along with a few shrubs of fringed sagewort and brittle cactus. This site has a shallower sodic subsoils layer, less production, similar species, more blue grama, less needleandthread, and green needlegrass.]

## 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: Stan Boltz, NRCS Range Management Specialist; Michael D. Brand, State Land Dept., Director Surface Management; David Dewald, NRCS State Biologist; Paul Drayton, NRCS District Conservationist; Jody Forman, NRCS Range Management Specialist; Dennis Froemke, NRCS Range Management Specialist; Jeff Printz, NRCS State Range Management Specialist; Josh Saunders, NRCS Range Management Specialist; Kevin Sedivec, Extension Rangeland Management Specialist; Darrell Vanderbusch, NRCS Resource Soil Scientist; and Lee Voigt, NRCS Range Management Specialist.

## State Correlation

This site has been correlated with North Dakota and South Dakota in MLRA 53B.

## Field Offices

Aberdeen, SD	Gettysburg, SD	Minot, ND	Steele, ND
Ashley, ND	Ipswich, SD	Mohall, ND	Towner, ND
Bismarck, ND	Jamestown, ND	Mound City, SD	Turtle Lake, ND
Bowbells, ND	LaMoure, ND	Napoleon, ND	Watford City, ND
Ellendale, ND	Leola, SD	Redfield, SD	Williston, ND
Faulkton, SD	Linton, ND	Selby, SD	
Garrison, ND	McClusky, ND	Stanley, ND	

## Relationship to Other Established Classifications

Level IV Ecoregions of the Conterminous United States: 42a – Missouri Coteau; 42b – Collapsed Glacial Outwash; 42c – Missouri Coteau Slope; 42d – Northern Missouri Coteau; 42f – Southern Missouri Coteau Slope; 42g – Ponca Plains; and 42h – Southern River Breaks.

## Other References

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

**Site Type: Rangeland**  
**MLRA: 53B – Central Dark Brown Glaciated Plains**

**Claypan**  
**R053BY002ND**

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. 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**

\_\_\_\_\_  
ND, State Range Management Specialist      Date

\_\_\_\_\_  
SD, State Range Management Specialist      Date