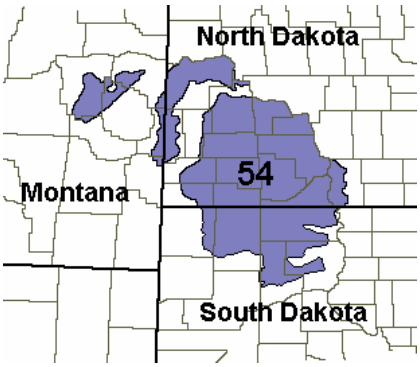
United States Department of Agriculture
Natural Resources Conservation Service

Ecological Site Description



Site Name: Closed Depression

Site Type: Rangeland

Site ID: R054XY022ND

Major Land Resource Area: 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 level shallow lake basins and flat enclosed upland depressions.

Landform: depressions

Aspect: NA

	Minimum	Maximum
Elevation (feet):	1600	3600
Slope (percent):	0	1
Water Table Depth (inches):	0	>72
Flooding:		
Frequency:	None	None
Duration:	None	None
Ponding:		
Depth (inches):	0	1
Frequency:	occasional	frequent
Duration:	long	very long
Runoff Class:	negligible	negligible

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, ND) to about 16° F (Bison, 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.

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

Average Monthly Precipitation (inches) and Temperature (ºF):

	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

Wetland Description:	**System**	**Subsystem**	**Class**	**Sub-class**
Cowardin, et al., 1979	Palustrine	N/A	Emergent	Persistent

Representative Soil Features

The common features of soils in this site are the silty clay to clay textured subsoil and slopes of 0 to 1 percent. The soils in this site are poorly drained and formed in alluvium. The silt loam to silty clay surface layer is 1 to 6 inches thick. The extremely hard clayey Btn horizon has a round-topped or bun shaped columnar structure. These Btn horizons are high in sodium. The soils have a moderately slow to very slow infiltration rate. Available water capacity is 1 to 6 inches. The soils crack when dry and heavy traffic can cause surface compaction when wet. Sub-surface soil layers are restrictive to water movement and root penetration. 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.

These soils are not susceptible to water erosion. Low available water capacity coupled with high accumulations of sodium and slow permeability strongly influences the soil-water-plant relationship.

Major soil series correlated to this ecological site can be found in Section II of the Natural Resources Conservation Service 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
Parent Material Origin: sedimentary, unspecified
Surface Texture: silt loam, silty clay loam, silty clay
Surface Texture Modifier: none
Subsurface Texture Group: clayey
Surface Fragments ≤ 3" (% Cover): 0
Surface Fragments > 3" (%Cover): 0
Subsurface Fragments ≤ 3" (% Volume): 0-10
Subsurface Fragments > 3" (% Volume): 0-1

	Minimum	Maximum
Drainage Class:	poorly	poorly
Permeability Class:	very slow	slow
Depth to first restrictive layer (inches):	6	12
Electrical Conductivity (mmhos/cm)*:	0	16
Sodium Absorption Ratio*:	2	25
Soil Reaction (1:1 Water)*:	5.6	9.0
Soil Reaction (0.1M CaCl2)*:	NA	NA
Available Water Capacity (inches)*:	1	6
Calcium Carbonate Equivalent (percent)*:	0	15

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

Plant Communities

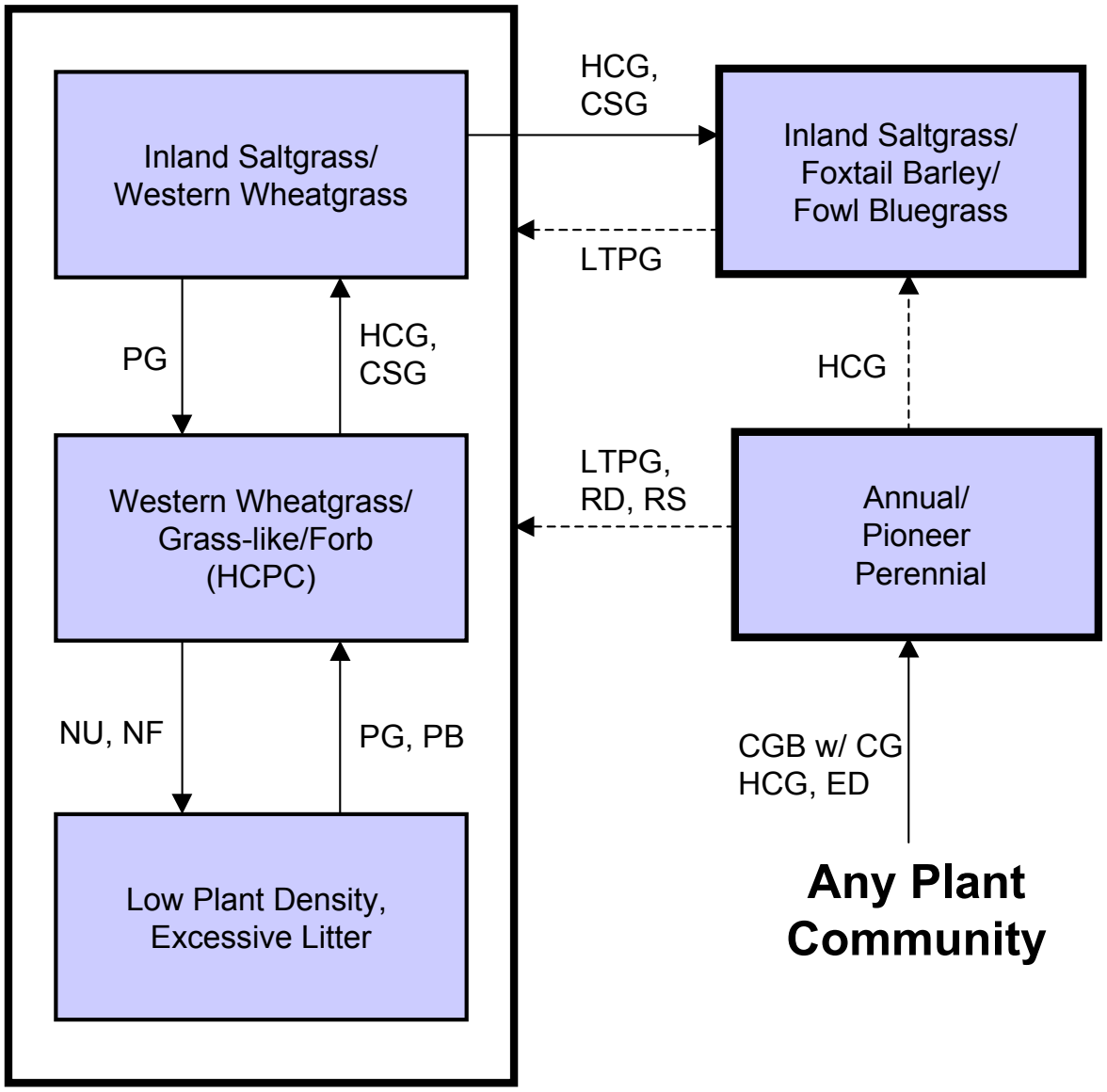
Ecological Dynamics of the Site:
The site developed under Northern Great Plains climatic conditions, and included natural influence of large herbivores, periodic flooding events and occasional fire. Changes will occur in the plant communities due to climatic conditions and/or management actions. Due to the nature of the soils, the site is considered moderately resilient. Under continued adverse impacts, a moderate decline in vegetative vigor and composition will occur. Under favorable vegetative management treatments the site can more readily return to the Historic Climax Plant Community (HCPC).

The plant community upon which interpretations are primarily based is the Historic Climax Plant Community. 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 used. 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. Inland saltgrass will begin to increase. Western wheatgrass will increase initially and then begin to decrease. In time, heavy continuous grazing will cause inland saltgrass, foxtail barley, fowl bluegrass, other 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 and decadent plants.

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; **HCG** - heavy continuous grazing; **HCPC -** Historic Climax Plant Community; **LTPG -** long-term prescribed grazing (>20 years); **NU, NF -** non-use, no-fire; **PB** - prescribed burning followed by prescribed grazing; **PG -** pre-scribed grazing with adequate recovery opportunity; **RD** - removal of disturbance; **RS** - range seeding with prescribed grazing

Plant Community Composition and Group Annual Production

		Western Wheatgrass/Cordgrass (HCPC)		
COMMON/GROUP NAME	**SYMBOL**	**Group**	**lbs./acre**	**% Comp**
GRASSES			*1680 - 1920*	*70 - 80*
western wheatgrass	PASM	1	840 - 960	35 - 40
CORDGRASS		**2**	**240 - 360**	**10 - 15**
prairie cordgrass	SPPE	2	120 - 240	5 - 10
alkali cordgrass	SPGR	2	120 - 240	5 - 10
OTHER NATIVE		**3**	**240 - 360**	**10 - 15**
foxtail barley	HOJU	3	0 - 48	0 - 2
fowl bluegrass	POPA2	3	48 - 120	2 - 5
inland saltgrass	DISP	3	48 - 120	2 - 5
Nuttall's alkaligrass	PUNU2	3	48 - 120	2 - 5
slender wheatgrass	ELTRT	3	48 - 120	2 - 5
American sloughgrass	BESY	3	0 - 24	0 - 1
plains bluegrass	POAR3	3	24 - 48	1 - 2
alkali muhly	MUAS	3	0 - 24	0 - 1
ticklegrass	AGSC5	3	48 - 72	2 - 3
other perennial grasses	2GP	3	24 - 120	1 - 5
GRASS-LIKES		*4*	*240 - 360*	*10 - 15*
prairie bulrush	SCMA8	4	0 - 120	0 - 5
rush	JUNCU	4	48 - 72	2 - 3
sedge	CAREX	4	72 - 120	3 - 5
common spikerush	ELPA3	4	96 - 192	4 - 8
needle spikerush	ELAC	4	48 - 72	2 - 3
other grass-likes	2GL	4	48 - 72	2 - 3
FORBS		*5*	*120 - 360*	*5 - 15*
alkali plantain	PLER	5	24 - 24	1 - 1
American licorice	GLLE3	5	24 - 48	1 - 2
lambsquarters	CHAL7	5	24 - 24	1 - 1
pepperweed	LEPID	5	24 - 24	1 - 1
povertyweed	IVAX	5	24 - 24	1 - 1
prairie ironweed	VEFA2	5	0 - 24	0 - 1
Pursh seepweed	SUCA2	5	0 - 24	0 - 1
purslane	POOL	5	0 - 24	0 - 1
silverleaf cinquefoil	POAR8	5	48 - 72	2 - 3
slender cinquefoil	POGRF2	5	48 - 72	2 - 3
smartweed	POLYG4	5	24 - 48	1 - 2
western dock	RUAQ	5	48 - 72	2 - 3
wild mint	MEAR4	5	24 - 48	1 - 2
other perennial forbs	2FP	5	24 - 48	1 - 2

Annual Production lbs./acre	LOW	RV	HIGH
GRASSES	1165 -	1860	- 2450
GRASS-LIKES	220 -	300	- 375
FORBS	115 -	240	- 375
TOTAL	1500 -	2400	- 3200

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

		Western Wheatgrass/ Grass-like/Forb (HCPC)			Inland Saltgrass/ Western Wheatgrass			Low Plant Density, Excessive Litter			Inland Saltgrass/Foxtail Barley/Fowl Bluegrass		
COMMON/GROUP NAME	**SYMBOL**	**Grp**	**lbs./acre**	**% Comp**	**Grp**	**lbs./acre**	**% Comp**	**Grp**	**lbs./acre**	**% Comp**	**Grp**	**lbs./acre**	**% Comp**
GRASSES			*1680 - 1920*	*70 - 80*		*1600 - 1800*	*80 - 90*		*1300 - 1500*	*65 - 75*		*1200 - 1360*	*75 - 85*
western wheatgrass	PASM	1	960 - 1200	40 - 50	1	900 - 1000	45 - 50	1	300 - 500	15 - 25	1	240 - 400	15 - 25
cordgrass	SPART	2	0 - 120	0 - 5	2	0 - 20	0 - 1	2	0 - 100	0 - 5			
OTHER NATIVE		**3**	**240 - 360**	**10 - 15**	**3**	**400 - 500**	**20 - 25**	**3**	**300 - 500**	**15 - 25**	**3**	**640 - 800**	**40 - 50**
foxtail barley	HOJU	3	0 - 48	0 - 2	3	100 - 200	5 - 10	3	40 - 60	2 - 3	3	320 - 640	20 - 40
fowl bluegrass	POPA2	3	48 - 120	2 - 5	3	100 - 200	5 - 10	3	100 - 200	5 - 10	3	160 - 240	10 - 15
inland saltgrass	DISP	3	48 - 120	2 - 5	3	300 - 400	15 - 20	3	40 - 100	2 - 5	3	320 - 640	20 - 40
Nuttall's alkaligrass	PUNU2	3	48 - 120	2 - 5	3	40 - 100	2 - 5	3	100 - 200	5 - 10	3	0 - 32	0 - 2
slender wheatgrass	ELTRT	3	48 - 120	2 - 5	3	0 - 20	0 - 1	3	60 - 120	3 - 6	3	0 - 16	0 - 1
American sloughgrass	BESY	3	0 - 24	0 - 1	3			3	0 - 20	0 - 1	3		
plains bluegrass	POAR3	3	24 - 48	1 - 2	3	40 - 60	2 - 3	3	40 - 60	2 - 3	3	0 - 16	0 - 1
alkali muhly	MUAS	3	0 - 24	0 - 1	3						3		
ticklegrass	AGSC5	3	48 - 72	2 - 3	3	60 - 100	3 - 5	3	80 - 100	4 - 5	3	16 - 32	1 - 2
other perennial grasses	2GP	3	24 - 120	1 - 5	3	20 - 60	1 - 3	3	40 - 100	2 - 5	3	0 - 16	0 - 1
NON-NATIVE		**4**			**4**	**60 - 100**	**3 - 5**	**4**	**100 - 200**	**5 - 10**	**4**		
Kentucky bluegrass	POPR					60 - 100	3 - 5		100 - 200	5 - 10			
other grasses	2GRAM					0 - 20	0 - 1		20 - 40	1 - 2			
GRASS-LIKES		*5*	*240 - 360*	*10 - 15*	*5*	*100 - 200*	*5 - 10*	*5*	*200 - 300*	*10 - 15*	*5*	*80 - 160*	*5 - 10*
prairie bulrush	SCMA8	5	0 - 120	0 - 5	5	0 - 100	0 - 5	5	0 - 60	0 - 3	5	16 - 48	1 - 3
rush	JUNCU	5	48 - 72	2 - 3	5	60 - 100	3 - 5	5	20 - 40	1 - 2	5	48 - 80	3 - 5
sedge	CAREX	5	72 - 120	3 - 5	5	40 - 60	2 - 3	5	40 - 80	2 - 4	5	32 - 48	2 - 3
common spikerush	ELPA3	5	96 - 192	4 - 8	5	20 - 40	1 - 2	5	60 - 120	3 - 6	5	16 - 32	1 - 2
needle spikerush	ELAC	5	48 - 72	2 - 3	5	60 - 100	3 - 5	5	40 - 80	2 - 4	5	48 - 80	3 - 5
other grass-likes	2GL	5	48 - 72	2 - 3	5	20 - 40	1 - 2	5	20 - 40	1 - 2	5	16 - 32	1 - 2
FORBS		*6*	*120 - 360*	*5 - 15*	*6*	*120 - 180*	*6 - 9*	*6*	*300 - 400*	*15 - 20*	*6*	*160 - 240*	*10 - 15*
alkali plantain	PLER	6	24 - 24	1 - 1	6	0 - 20	0 - 1	6	20 - 20	1 - 1	6	0 - 16	0 - 1
American licorice	GLLE3	6	24 - 48	1 - 2	6	0 - 20	0 - 1	6	40 - 60	2 - 3	6	0 - 16	0 - 1
cocklebur	XANTH2				6	0 - 40	0 - 2	6	0 - 40	0 - 2	6	0 - 48	0 - 3
curly dock	RUCR				6	80 - 160	4 - 8	6	200 - 300	10 - 15	6	80 - 160	5 - 10
curlycup gumweed	GRSQ				6	0 - 40	0 - 2	6	0 - 20	0 - 1	6	0 - 48	0 - 3
lambsquarters	CHAL7	6	24 - 24	1 - 1	6	20 - 40	1 - 2	6	40 - 60	2 - 3	6	32 - 48	2 - 3
pepperweed	LEPID	6	24 - 24	1 - 1	6	20 - 40	1 - 2	6	20 - 40	1 - 2	6	32 - 48	2 - 3
povertyweed	IVAX	6	24 - 24	1 - 1	6	40 - 60	2 - 3	6	20 - 20	1 - 1	6	32 - 64	2 - 4
prairie ironweed	VEFA2	6	0 - 24	0 - 1	6	0 - 60	0 - 3	6	0 - 40	0 - 2	6	0 - 64	0 - 4
Pursh seepweed	SUCA2	6	0 - 24	0 - 1				6	0 - 40	0 - 2			
purslane	POOL	6	0 - 24	0 - 1	6	0 - 40	0 - 2	6	0 - 40	0 - 2	6	0 - 48	0 - 3
silverleaf cinquefoil	POARA3	6	48 - 72	2 - 3				6	60 - 80	3 - 4			
slender cinquefoil	POGRF2	6	48 - 72	2 - 3				6	40 - 60	2 - 3			
smartweed	POLYG4	6	24 - 48	1 - 2	6	0 - 40	0 - 2	6	0 - 60	0 - 3	6	32 - 48	2 - 3
western dock	RUAQ	6	48 - 72	2 - 3	6	40 - 80	2 - 4	6	60 - 80	3 - 4	6	64 - 96	4 - 6
wild mint	MEAR4	6	24 - 48	1 - 2	6	0 - 20	0 - 1	6	40 - 60	2 - 3			
other perennial forbs	2FP	6	24 - 48	1 - 2	6	0 - 20	0 - 1	6	20 - 40	1 - 2	6	0 - 16	0 - 1
non-native forbs	2FORB				6	0 - 20	0 - 1	6	20 - 40	1 - 2	6	0 - 16	0 - 1

Annual Production lbs./acre	LOW · RV · HIGH	LOW · RV · HIGH	LOW · RV · HIGH	LOW · RV · HIGH
GRASSES	1165 · 1860 · 2450	1290 · 1700 · 2110	785 · 1400 · 1950	770 · 1280 · 1585
GRASS-LIKES	220 · 300 · 375	95 · 150 · 205	195 · 250 · 325	75 · 120 · 165
FORBS	115 · 240 · 375	115 · 150 · 185	220 · 350 · 425	155 · 200 · 250
TOTAL	1500 · 2400 · 3200	1500 · 2000 · 2500	1200 · 2000 · 2700	1000 · 1600 · 2000

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 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”. According to the USDA NRCS National Range and Pasture Handbook, Desired Plant Communities (DPC’s) will be determined by the decision-makers and will meet minimum quality criteria established by the NRCS. The main purpose for including any description of a plant community here is to capture the current knowledge and experience at the time of this revision.

Western Wheatgrass/Grass-likes/Forbs Plant Community

This is the interpretive plant community and is considered to be the Historic Climax Plant Community (HCPC). This community evolved with grazing by large herbivores, occasional prairie fires and periodic flooding events. This plant community can be found on areas that are properly managed with grazing and/or prescribed burning, and sometimes on areas receiving occasional short periods of rest. The potential vegetation is about 70% grasses, 15% grass-like plants and 15% forbs. Western wheatgrass dominates the plant community. Other grasses and grass-like plants include Nuttall's alkaligrass, slender wheatgrass, inland saltgrass, fowl bluegrass, ticklegrass, common spikerush, needle spikerush and other rushes and sedges. Significant forbs include American licorice, silverleaf cinquefoil, slender cinquefoil and western dock. There are no principal shrubs that occur on this site.

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 off-site and natural plant mortality is very low. The diversity in plant species allows for both the fluctuation of ponding as well as the occurrence of randomly occurring drought.

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: ND5412
Growth curve name: Missouri Slope, Lowlands, Cool/Warm-season Mix.
Growth curve description: Lowlands, cool-season/tall warm-season dominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	0	3	35	35	15	5	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 will move this plant community to the *Low Plant Density, Excessive Litter Plant Community*.
- Heavy, continuous grazing will convert the plant community to the *Inland Saltgrass/Western Wheatgrass Plant Community*.
- Continuous seasonal (i.e. spring) grazing will convert the plant community to the *Inland Saltgrass/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*.

Inland Saltgrass/Western Wheatgrass Plant Community

This plant community is the result of a short-term heavy use, or a longer term continuous grazing and/or annual, early spring seasonal grazing. Repeated defoliation depletes stored carbohydrates, resulting in weakening and eventual death of the most palatable grasses. Lack of litter and reduced plant vigor result in higher soil temperatures, poor water infiltration rates, high evapotranspiration and increased percolation of the high water table, which increases salt concentrations on the surface. This gives inland saltgrass and other salt tolerant species a competitive advantage over less tolerant species. Inland saltgrass drastically increases and over takes the western wheatgrass as the dominant species with the balance being a few species of cool-season grasses, and grass-likes including Nuttall's alkaligrass, plains bluegrass, ticklegrass, common spikerush, needle spikerush and other sedges and rushes.

Early cool-season grasses including foxtail barley, fowl bluegrass and Kentucky bluegrass begin to invade. Forbs that will invade are curly dock, curlycup gumweed and cocklebur while lambsquarters, pepperweed, povertyweed, purslane and western dock increase.

This plant community is relatively stable and well adapted to increased salinity. Plant vigor, litter, frequency and production have decreased. The biological integrity, water and nutrient cycles of this plant community are becoming impaired. This plant community is less productive than the HCPC.

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 & 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 without adequate recovery opportunity between grazing events will move this plant community across an ecological threshold to the *Inland Saltgrass/Foxtail Barley/Fowl Bluegrass Plant Community*.
- Continuous seasonal (i.e. spring) grazing will convert the plant community to the *Inland Saltgrass/Foxtail Barley/Fowl Bluegrass Plant Community*.
- Cropped go-back land with continuous grazing will convert this plant community to the *Annual/Pioneer Perennial Plant Community*.
- Prescribed grazing that includes changing season of use and allowing adequate recovery periods between grazing events will lead this plant community back to the *Western Wheatgrass/Grass-likes/Forbs Plant Community (HCPC)*.

Inland Saltgrass/Foxtail Barley/Fowl Bluegrass Plant Community

This plant community developed with heavy continuous grazing where adequate recovery periods between grazing events were not allowed. Patches of inland saltgrass sod are typical and foxtail barley and fowl bluegrass is well distributed throughout the community. Nuttall's alkaligrass and western wheatgrass have been greatly reduced in production and vigor, and may persist in remnant amounts.

This plant community is resistant to change due to the grazing tolerance of inland saltgrass and increased surface salts. A significant amount of production and diversity has been lost when compared to the HCPC. Loss of key cool season grasses and increased bare ground have negatively impacted energy flow and nutrient cycling. Water infiltration is reduced significantly due to the massive shallow root system "root pan", characteristic of inland saltgrass, and increased bare ground. It will take a long time to bring this plant community back to the HCPC with management alone. Renovation (mechanical and/or chemical inputs) is not recommended due to high salt content of the soil and saltgrass persistence.

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: ND5405
Growth curve name: Missouri Slope, Warm-season Short Grass.
Growth curve description: Warm season, short grass dominant, and some sedge.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	1	7	18	33	26	10	4	1	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 will move through the successional stages, and may eventually lead to the *Inland Saltgrass/Western Wheatgrass Plant Community* and possibly the *Western Wheatgrass/Grass-likes/Forbs Plant Community*. This process will take a long period of time (25+ years).

Low Plant Density, Excessive Litter Plant Community

This plant community occurs when grazing is removed for long periods of time (rest) in the absence of fire. Plant composition is similar to the HCPC, however individual species production and frequency will be lower.

Much of the nutrients are tied up in excessive litter. Standing dead plant residues that are not in contact with a moist soil surface result in a slow nutrient cycling process. Above ground litter also limits sunlight from reaching plant crowns. Many plants, especially the warm-season grasses (inland saltgrass) reduce in density and vigor and typically develop into small but dense colonies. Thick litter and absence of grazing animals (animal impact) and fire reduces seed germination and establishment. This plant community develops after an extended period (10+ years) of non-use by herbivores and exclusion of fire.

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/Grass-likes/Forbs Plant Community (HCPC)*. If non-native species are dominant, this would require long-term management with prescribed grazing and/or prescribed burning under controlled conditions.

Annual/Pioneer Perennial Plant Community

This plant community develops under severe disturbance, long duration flooding events and/or excessive defoliation. This can result from heavy livestock or wildlife concentration, enduring wet cycles 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 foxtail barley, which may become dominant along with fowl bluegrass, Nuttall's alkaligrass, and western wheatgrass. The dominant forbs include curly dock, curlycup gumweed, kochia, and other early successional salt tolerant species. Plant species from adjacent ecological sites may become minor components of this plant community. The community is susceptible to non-native species due to severe soil disturbances and relatively high percent of bare ground.

This plant community is resistant to change, as long as soil disturbance or severe vegetation defoliation persists, thus holding back secondary plant succession. 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.

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 a plant community resembling the *Western Wheatgrass/Grass-likes/Forbs Plant Community* (HCPC). This process will take a long period of time (15+ years).
- Heavy, continuous grazing will result in a shift towards the *Inland Saltgrass/Foxtail Barley/Fowl Bluegrass 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

-- Under Development --

Western Wheatgrass/Grass-likes/Forbs Plant Community:

Inland Saltgrass/Western Wheatgrass Plant Community:

Inland Saltgrass/Foxtail Barley/Fowl Bluegrass Plant Community:

Low Plant Density, 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
Grasses & Grass-likes							
alkali cordgrass	U D D U	N U N N	U D D U	N U N N	N U N N	U D D U	U D D U
alkali 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
American sloughgrass	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
common spikerush	N U D U	N U U N	N U D U	N U U N	N U U N	N U D U	N U D U
fowl bluegrass	N U U N	N U U N	N U U N	N U U N	N U U N	N U U N	N U U N
foxtail barley	U D N N	N P N N	U D N N	N P N N	N P N N	U D N N	U D N N
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
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
needle spikerush	N U D U	N U U N	N U D U	N U U N	N U U N	N U D U	N U D U
Nuttall's alkaligrass	U P D D	P P P P	U P D D	P P P P	P P P P	U P D D	U P D D
plains bluegrass	U D U D	N D N U	U D U D	U P N D	U P N D	U D U D	U D U D
prairie bulrush	U U U U	N N N N	U U U U	N N N N	N N N N	U U U U	U U U U
prairie cordgrass	U D D U	N N N N	U D D U	N N N N	N N N N	U D D U	U D D U
rush	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
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
slender 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
ticklegrass	U D U U	U D U U	U D U U	U D U U	U D U U	U D U U	U D 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							
alkali plantain	U D U U	N U U N	U D U U	N U U N	N U U N	U D U U	N U U N
American licorice	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
lambsquarters	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
pepperweed	N N N N	N N N N	N U N N	N N N N	N N N N	N N N N	N N N N
povertyweed	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
prairie ironweed	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
Pursh seepweed	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
purslane	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
silverleaf cinquefoil	U U D U	U U U U	U U D U	U U U U	U U U U	U U D U	U U U U
slender cinquefoil	N N N N	N U D N	N N N N	N U D N	N U D N	N N N N	N U D N
smartweed	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 dock	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 mint	U D U U	U P P U	U D U U	U P P U	U P P U	U D U U	U P P 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 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 Capacity [1] (AUM/acre)
Western Wheatgrass/Grass-likes/Forbs (HCPC)	2400	0.76 [2]
Inland Saltgrass/Western Wheatgrass	2000	0.63 [2]
Inland Saltgrass/Foxtail Barley/Fowl Bluegrass	1600	0.50 [2]
Low Plant Density, Excessive Litter	2000	0.63 [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 on site.

Hydrology Functions

Water is the principal factor limiting herbage production on this site. The site is dominated by soils in hydrologic groups D. Infiltration varies from moderate to slow and the site is a depression without any runoff potential. In many cases, areas with greater than 75% 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% 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 that bloom from spring until fall have an esthetic value that appeals to visitors.

Wood Products

No appreciable wood products are present on the site.

Other Products

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

Supporting Information

Associated Sites

(054XY020ND) – Clayey
(054XY021ND) – Claypan
(054XY033ND) – Thin Claypan
(054XY036ND) – Wet Land

Similar Sites

(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 green needlegrass, blue grama, less production, different landscape position, no dock or smart weed, does have a sodic soil layer, nor will flood.]

(054XY024ND) – Saline Lowland (SL)
[Found adjacent to streams, toe slopes, foot slopes or sideslopes. Most are poorly drained soils, with water table at the surface or within 3 feet from the surface with evidence of salts within soil profile, noticeable redoximorphic features within 6 inches or just below the organic soil layer. Found upslope from wet land or wet meadow and downslope of subirrigated or overflow sites. Can be located within the listed associated sites. Indicator species are Nuttall's alkaligrass intermixed with western wheatgrass, some rushes and sedges. This site has similar species and production, less western wheatgrass, more prairie cordgrass, and a water table.

(054XY033ND) – 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 that restricts 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, cactus and Nuttall's Saltbush. This site has blue grama but less western wheatgrass, far less production, different landscape position, no dock or smartweed, does have a sodic soil layer at similar depths but will not flood.]

(054XY037ND) – Wet Meadow (WM)
[Poorly drained soils found adjacent to streams or in depressions, with water table at the surface or within 1.5 feet from the surface with no evidence of salts, noticeable redoximorphic features within 6 inches or just below the organic soil layer. Found upslope from wet land and downslope of subirrigated or overflow sites; can be located within the listed associated sites. Indicator species are prairie cordgrass, northern reedgrass and no shrub. This site has more production, far less western wheatgrass and far more prairie cordgrass, and a water table without a restrictive sodic layer or evidence of salts within the soil profile.

(054XY036ND) – Wet Land (WL)
[Very poorly drained soils with noticeable redoximorphic features within 6 inches or just below the organic soil layer, found in depressions and along streams where water ponds at or above the surface for more the 7 days. Found down slope of wet meadow sites and can be in micro low positions within the listed associated sites. Indicator species are slough sedge, whitetop, prairie cordgrass, cattail, smartweed and no shrub. This site has similar landscape position, more production, no western wheatgrass and far more prairie cordgrass and slough sedge, no restrictive sodic layer or evidence of salts within the soil profile.]

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. Information presented here has been derived from NRCS clipping and other inventory data. 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; L. Michael Stirling, NRCS Range Management Specialist; Stan Boltz, NRCS Range Management Specialist; Darrell Vanderbusch, NRCS Resource Soil Scientist; David Dewald, NRCS State Biologist; and Brad Podoll, NRCS Biologist.

Data Source	Number of Records	Sample Period	State	County
SCS-RANGE-417	0			
Ocular estimates	3	1987 – 2000	ND	Dunn, Hettinger, Stark

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://hpccsun.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. 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

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State Range Management Specialist Date

_____ _____
State Range Management Specialist Date