USDA Natural Resources
Conservation Service

Ecological site R055BY074ND
Subirrigated Sands

Accessed: 05/03/2024

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

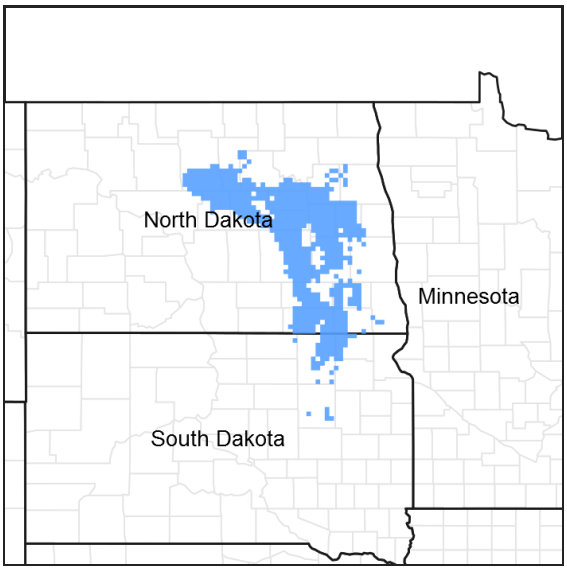


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

Associated sites

R055BY061ND	**Sands**
R055BY062ND	**Sandy**
R055BY065ND	**Subirrigated**

Similar sites

R055BY065ND	**Subirrigated**
R055BY061ND	**Sands**

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Andropogon gerardii* (2) *Andropogon hallii*

Physiographic features

This site occurs on gently undulating to rolling and steep uplands.

Table 2. Representative physiographic features

Landforms	(1) Till plain (2) Terrace (3) Lake plain
Flooding duration	Brief (2 to 7 days)
Flooding frequency	None to rare
Ponding frequency	None
Elevation	305–640 m
Slope	2–30%
Water table depth	91–203 cm
Aspect	Aspect is not a significant factor

Climatic features

MLRA 55B 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 16 to 21 inches per year. The normal average annual temperature is about 41.5° F. January is the coldest month with average temperatures ranging from about 2° F (Maddock, ND) to about 11° F (Mellette, SD). July is the warmest month with temperatures averaging from about 67° F (Maddock, ND) to about 73° F (Redfield 2 NE, SD). The range of normal average monthly temperatures between the coldest and warmest months is about 64° 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.

Table 3. Representative climatic features

Frost-free period (average)	146 days
Freeze-free period (average)	129 days
Precipitation total (average)	483 mm

Influencing water features

No significant water features influence this site.

Soil features

These are deep to very deep, moderately well drained, coarse textured soils. Saturated hydraulic conductivity is moderately rapid to rapid and available water capacity is very low to mpderate. Salinity is none and sodicity is none. These soils have a high water table (1.5 to 3.5 feet from the surface) which keeps the rooting zone moist for most of the growing season. This site is on flats and swales on eolian sand plains. Slope ranges from 0 to 6 percent. This site should show slight to no evidence of rills, wind scoured areas or pedestalled plants. No water flow paths are seen on this site. The soil surface is stable and intact. Sub-surface soil layers are non-restrictive to water movement and root penetration.

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:
Access Web Soil Survey (http://websoilsurvey.nrcs.gov/app/) for specific local soils information.

Table 4. Representative soil features

Surface texture	(1) Loamy fine sand (2) Loamy sand
Family particle size	(1) Sandy
Drainage class	Moderately well drained
Permeability class	Rapid
Soil depth	203 cm
Surface fragment cover <=3"	0–15%
Surface fragment cover >3"	0–1%
Available water capacity (0-101.6cm)	7.62–22.86 cm
Calcium carbonate equivalent (0-101.6cm)	0–20%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	5.1–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–15%
Subsurface fragment volume >3" (Depth not specified)	0–5%

Ecological dynamics

The site developed under Northern Great Plains climatic conditions, and included natural influence of large herding herbivores and frequent fire. Changes will occur in the plant communities due to weather fluctuations and/or management actions. Under adverse impacts, a slow decline in vegetative vigor and composition will occur. Under favorable conditions the site has the potential to resemble the reference state(1.1 Bluestem/ Needlegrass). Interpretations for this site are based on 1.1 Bluestem/Needlegrass plant community. The Bluestem/Needlegrass plant community 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. Community phases, community pathways, states, transitions, thresholds and restoration pathways have been determined through similar studies and experience.

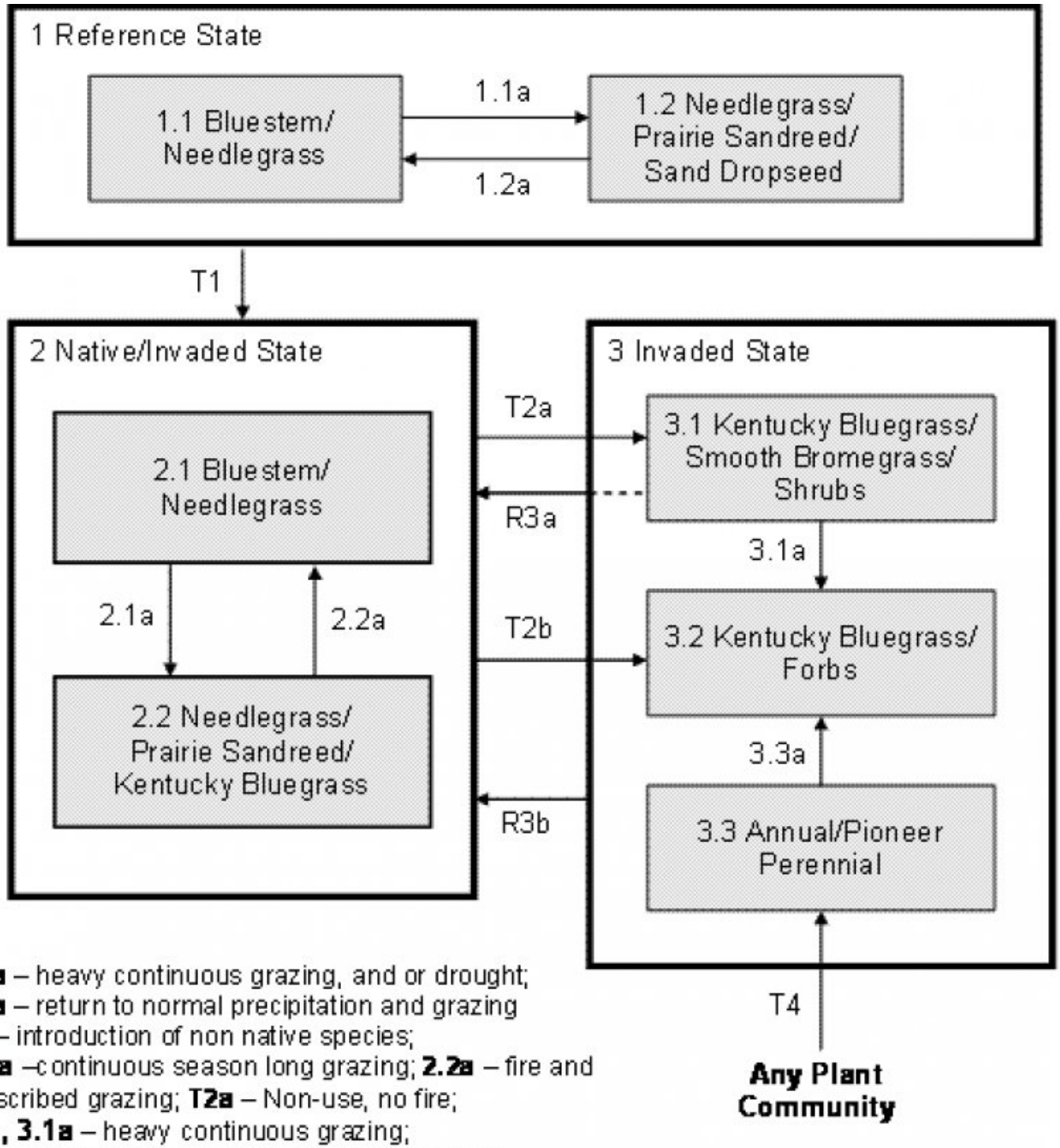
The natural disturbance regime consisted of frequent fires caused both by natural and Native American ignition sources. These fires occurred during any season of the year, but were concentrated in the spring and late summer or early fall. Lightning fires occurred most frequently in July and August while fires started by Native Americans occurred in April, September and October. Large ungulate grazing was heavy and occurred often, but usually for short durations. Grazing may have been severe when occurring after a fire event. The grazing and fire interaction especially when coupled with drought events, set up the dynamics discussed and displayed in the following state and transition diagram and descriptions.

This ecological site has been grazed by domestic livestock since introduced into the area. The introduction of domestic livestock and the use of fencing and reliable water sources have radically changed the disturbance regime of this site. Heavy continuous grazing and/or continuous seasonal (spring) grazing, without adequate recovery

periods following each grazing occurrence causes this site to depart from the reference plant community. Needleandthread, sand dropseed and Kentucky bluegrass if present, will begin to increase. Species such as big bluestem, sand bluestem, prairie sandreed, and porcupine grass decrease in frequency and production. Little bluestem will increase initially and then begin to decrease. In time, heavy continuous grazing will likely cause Kentucky bluegrass, if present to dominate and pioneer perennials and annuals to increase. Heavy disturbance through improper grazing, wildfire, excessive defoliation or any type of physical disturbance can lead to serious erosion problems (blowout) on these fragile soils. 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 bromegrass as well as shrub species such as western snowberry. Remnant native plants may be present but are reduced in vigor. Shrubs such as western snowberry increase in this situation, especially in areas prone to snow accumulation and drift.

The following diagram illustrates the common states, community phases, community pathways, transitions and restoration pathways that can occur on the site.

State and transition model



1.1a – heavy continuous grazing, and or drought;
1.2a – return to normal precipitation and grazing
T1 – introduction of non native species;
2.1a –continuous season long grazing; **2.2a** – fire and prescribed grazing; **T2a** – Non-use, no fire;
T2b, 3.1a – heavy continuous grazing;
3.3a –grazing and time; **T4** – cropped go back;
R3a –range seeding and brush management and prescribed grazing;
R3b –range seeding, prescribed burning and prescribed grazing.

State 1
Reference

This state represents the natural range of variability that dominates the dynamics of this ecological site. This state is dominated by warm- and cool-season grasses. The primary disturbance mechanisms for this site in the reference condition include frequent fire and grazing by large herding ungulates. Timing of fires and grazing coupled with weather events dictate the dynamics that occur within the natural range of variability. Mid and tall stature grass species can decline and a corresponding increase in short stature warm-season grasses and cool-season grass-like species will occur. Slight shifts would have occurred in the timing of energy capture, hydrologic function and

nutrient cycling between plant community phases within State 1. High basal density, minimal bare ground, and deep root systems resulted in low runoff rates and high infiltration. Overall, the ecological processes were functioning near optimum levels.

Community 1.1
Bluestem/Needlegrass

This community phase was the most dominant both temporally and spatially. The prevailing climate and weather patterns favored the development of this community phase. Mid statured cool-season bunchgrass such as needleandthread and porcupine grass would have been co-dominates with tall warm-season grasses such as prairie sandreed, big bluestem, and sand bluestem. Other grass and grass-likes species included sand dropseed, sideoats grama, prairie junegrass, western wheatgrass, Canada wildrye, blue grama, and sedge. A variety of leguminous and non-leguminous perennial forbs including bracted spiderwort, cudweed sagewort, heath aster, goldenrod, and silky prairie clover were present. Shrubs included prairie rose, willow and western snowberry. In this community phase, grasses and grass-likes would have constituted about 80 to 90 percent, forbs 5 to 10 percent and shrubs 5 to 10 percent of the annual production. This is the interpretive plant community phase and is described in the “Plant Community Composition and Group Annual Production” portion of this ecological site description. Community dynamics, nutrient cycling, water cycle and energy flow were functioning at near optimum levels. A good component of bunchgrasses, minimal bare ground, litter in contact with the soil surface and deep rooted plants would have resulted in high infiltration rates and minimal runoff. Due to the balance between warm and cool season grasses, energy capture would have been spread across the entire growing season. Natural plant mortality was low. The diversity in plant species allowed for high drought tolerance.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	2365	3049	3654
Shrub/Vine	163	269	415
Forb	163	269	415
Total	**2691**	**3587**	**4484**

Figure 7. Plant community growth curve (percent production by month). ND5503, Central Black Glaciated Plains, cool-season/warm-season co-dominant.. 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

Community 1.2
Needlegrass/Prairie Sandreed/Sand Dropseed

This plant community shift results from heavy, frequent grazing over a period of several years and/or several consecutive years of below normal precipitation. This increase in grazing pressure may have resulted from proximity to a water source, changes in fire frequency and/or prolonged drought. Grasses and grass-like species would have still dominated this phase but the overall productivity of these species would have been reduced and the number and amount of forbs would have increased. Needleandthread would have displaced porcupine grass to become the dominant needlegrass while Prairie Sandreed, sand dropseed and sedges would have also increased as the more palatable tall warm season grasses were reduced by grazing pressure. Forb species such as cudweed sagewort, goldenrod, western ragweed, and heath aster would have increased.

Figure 8. Plant community growth curve (percent production by month). ND5502, Central Black Glaciated Plains, cool-season dominant, warm-season sub-dominant.. Cool-season dominant, warm-season sub-dominant..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	7	23	42	15	5	4	1	0	0

Pathway 1.1a
Community 1.1 to 1.2

Repeated heavy grazing either due to proximity to water or following short term fire intervals followed by intense grazing will convert the dominance to grazing tolerant grasses such as needleandthread, prairie sandreed and sand dropseed. This shift may have been facilitated by periods of below normal precipitation and heavy grazing.

Pathway 1.2a
Community 1.2 to 1.1

A return to normal precipitation and lighter grazing pressure allows the tall warm season grasses and porcupine grass to return to dominance.

State 2
Native/Invaded

This state is very similar to the Reference State. The invasion of introduced cool-season sodgrasses has altered the natural range of variability for this ecological site. This state still has a strong component of warm season grasses and cool-season bunchgrass species, but invasive introduced cool-season sodgrasses are now present in all community phases of this state. The primary disturbance mechanisms for this state include grazing by domestic livestock and infrequent fires.

Community 2.1
Bluestem/Needlegrass

This community phase most closely resembles the Reference State in appearance and ecological functions (e.g., hydrologic, biotic and soil/site stability). The warm and cool-season co-dominated community is maintained with grazing systems that allow for adequate recovery periods following grazing events, and potentially the combination of grazing and prescribed burning which closely mimics the natural disturbance regime. This community phase closely resembles the Reference State community phase 1.1 (see narrative for 1.1 Bluestem/Needlegrass). The basic difference between this community phase and 1.1 of the Reference State is the presence of minor amounts of introduced cool-season grasses and forbs. This is likely a naturally nitrogen deficient plant community, but perhaps less so than the Reference State. A change in the nutrient cycle on this ecological site possibly due to the introduction of non-native species may be a causative factor leading to the eventual dominance of cool-season introduced grasses in the Invaded State.

Figure 9. Plant community growth curve (percent production by month). ND5503, Central Black Glaciated Plains, cool-season/warm-season co-dominant.. 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

Community 2.2
Needlegrass/PrairieSandreed/Kentucky Bluegrass

Grazing pressure reduces the mid/tall, less grazing tolerant species, while the shorter more grazing tolerant species increase. Litter amounts are reduced, and energy capture shifts to slightly earlier in the growing season due to a decline in the later maturing native grass component and an increase in the earlier maturing grass-likes and non-native grasses. Kentucky bluegrass increases and may approach dominance in this community. Vegetation consists of about 80 to 90 percent grass and grass-like species, 5 to 15 percent forbs, and 2 to 5 percent shrubs. Significant grass species include Kentucky bluegrass, needleandthread, and prairie sandreed. The common forbs include western ragweed, scouring rush, and goldenrod. The common shrub would be western snowberry. This community phase is often dispersed throughout the pasture, in an overgrazed/undergrazed pattern, typically referred to as patch grazing. Some areas (overgrazed) will exhibit the impacts of heavy use, while other areas (undergrazed) will have a build-up of litter and a high amount of plant decadence. This is a typical pattern found in properly stocked pastures grazed season-long. In the undergrazed patches, 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. In the overgrazed patches, plant vigor is reduced and the competitive advantage goes towards the grazing tolerant species such as Kentucky bluegrass. Soil erosion is low. This community phase is approaching the threshold which would readily lead to the Invaded State. If management is significantly altered, this community phase can still be reverted back to the Bluestem/Needlegrass community. Grazing management that allows for adequate recovery periods will tend to restore the ecological functions of this site. Fire can play a role in reducing the introduced cool-season species. The combination of grazing and fire may be the most effective in moving this community phase towards a community resembling the Reference State.

Figure 10. Plant community growth curve (percent production by month). ND5502, Central Black Glaciated Plains, cool-season dominant, warm-season sub-dominant.. Cool-season dominant, warm-season sub-dominant..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	7	23	42	15	5	4	1	0	0

Pathway 2.1a
Community 2.1 to 2.2

This community pathway is triggered by a change in the natural disturbance regime, most often caused by either heavy, continuous season-long grazing or continuous seasonal grazing without adequate recovery periods (grazing at the same season of year for extended periods during the active growing season of the dominant native grasses). Along this pathway, the timing of energy capture shifts from early to mid summer to spring and early summer. The change in plant functional and structural groups and the composition and distribution of the vegetation causes a decrease in production and an increase in runoff with a corresponding decrease in infiltration. Nutrient cycling is restricted as the rooting depth of the vegetation decreases with the change in functional and structural groups. Plant community diversity is reduced with a loss of some native forbs and grasses.

Pathway 2.2a
Community 2.2 to 2.1

This community pathway is initiated by implementation of prescribed grazing management which includes adequate recovery periods following each grazing event, and stocking levels which match the available resources. If properly implemented, this will shift the competitive advantage from the introduced cool-season species to the native cool and warm-season grass species. The addition of prescribed burning may expedite this shift.

State 3
Invaded

This state is the result of invasion and dominance of Kentucky bluegrass and/or smooth brome. This state is characterized by these two species and an increasing thatch layer that effectively blocks introduction of other plants into the system. Once the state is well established, even drastic events such as high intensity fires driven by high fuel loads of litter and thatch will not result in more than a very short term reduction of these two species. These events may reduce the dominance of the introduced sodgrasses, but due to the large amount of rhizomes in the soil there is no opportunity for the native species to establish and dominate before the introduced sodgrasses rebound and again dominate the system. This state also includes the Annual, Pioneer Perennial community phase which is highly variable depending on the disturbance which causes this transition (T4). Over time, the Annual, Pioneer Perennial community phase will likely become dominated by introduced cool-season grasses, and shift to the Kentucky Bluegrass community phase (3.2).

Community 3.1
Kentucky Bluegrass/Smooth Bromegrass/Shrubs

This community phase is dominated by the shade tolerant cool-season sodgrasses including smooth brome and Kentucky bluegrass. Common forbs include goldenrod, American licorice, scurfpea, heath aster, and western yarrow. Western snowberry can increase and become a major component in this community phase. Remnants of native warm- and cool-season grasses are still present, but greatly reduced in vigor and production. Infiltration is reduced and runoff is increased when compared to the Reference State but soil erosion remains low. Nutrient

cycling is limited by the rooting depth of these species, the lack of leguminous forbs, and the alteration of the soil biotic community. Organic matter oxidizes in the air rather than being incorporated into the soil due to lack of animal impact and reduced soil biological activity. Energy capture into the system is restricted to a short window provided by the early season species and the high amount of dead standing plant material. This community phase is somewhat resistant to change. Once reached, time and external resources will be needed to see any immediate recovery. The combination of both prescribed grazing and prescribed fire is the most effective in moving this plant community towards State 2.

Figure 11. Plant community growth curve (percent production by month). ND5501, Central Black Glaciated Plains, cool-season dominant. 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

Community 3.2
Kentucky Bluegrass/Forbs

This community phase is dominated by Kentucky bluegrass with lesser amounts of sedge. Common forbs would include goldenrod, western yarrow, aster, western ragweed and a variety of introduced forbs. The longer this community phase exists the more resistant and resilient it becomes. Natural or management disturbances that reduce the cover of Kentucky bluegrass are very short lived due to the abundance of rhizomes of Kentucky bluegrass in the soil and the lack of propagules of other species present. Production is limited to the sod forming species. Energy capture into this system is limited to one early growing species. Runoff increases and is the highest of any plant community phase on this ecological site. Nutrient cycling is severely limited due to the shallow rooting depth of the Kentucky bluegrass and production is limited.

Figure 12. Plant community growth curve (percent production by month). ND5501, Central Black Glaciated Plains, cool-season dominant. 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

Community 3.3
Annual/Pioneer Perennial

The Annual, Pioneer Perennial community phase is highly variable depending on the level and duration of disturbance related to the T4 transitional pathway. In this MLRA, the most probable origin of this phase is secondary succession following cropland abandonment. This plant community will initially include a variety of annual forbs and grasses. Over time, the introduced cool-season perennial grasses will begin to establish on this site.

Pathway 3.1a
Community 3.1 to 3.2

This pathway is initiated by heavy continuous season-long grazing. The heavy continuous grazing favors those plants which can tolerate repeated defoliation (Kentucky bluegrass). Smooth brome will decrease with heavy use due to its elevated growth point. Western snowberry will experience mechanical damage and will decrease in production and cover. Grazing pressure reduces litter cover resulting in elevated soil surface temperatures increasing evaporation rates and further reducing biological activity.

Pathway 3.3a
Community 3.3 to 3.2

With grazing and time, the grazing tolerant Kentucky bluegrass will continue to increase leading to community phase 3.2. In the absence of grazing, this pathway will lead to a community phase resembling 3.1 with the primary difference being the lack of western snowberry and remnant native grass species.

Transition T1
State 1 to 2

This is the transition from the native warm and cool-season grass dominated Reference State to a state that has been invaded by introduced cool-season grass species. When propagules of Kentucky bluegrass are present, this transition occurs as natural and/or management actions favor a decline in the composition of native warm season grasses and cool-season bunchgrasses grasses and an increase in cool-season sodgrasses. This transition is compounded by a change in the historic grazing and fire regime where native herbivores would follow periodic fires with grazing. This historic grazing/fire sequence has largely been replaced by chronic season-long or heavy late season grazing. Complete rest from grazing and suppression of fire can also lead to this transition. The threshold between states is crossed when Kentucky bluegrass, smooth brome, and other introduced species become established on the site. These species typically are part of functional/structural groups that were not present in the Reference State.

Transition T4
State 1 to 3

This transition occurs with cessation of cropping practices being applied to any plant community phase on this ecological site

Transition T4
State 1 to 3

This transition occurs with cessation of cropping practices being applied to any plant community phase on this ecological site

Transition T4
State 2 to 3

This transition occurs with cessation of cropping practices being applied to any plant community phase on this ecological site

Transition T4
State 2 to 3

This transition occurs with cessation of cropping practices being applied to any plant community phase on this ecological site

Transition T2a
State 2 to 3

Complete rest from grazing and elimination of fire are the two major contributors to this transition, especially when smooth brome is present. The opportunity for high intensity spring burns is severely reduced by early green up, and increased moisture and humidity at the soil surface. Plant litter accumulation tends to favor the more shade tolerant introduced grass species. The nutrient cycle is also impaired, and the result is typically a higher level of nitrogen which also favors the introduced species. Increasing plant litter decreases the amount of sunlight reaching plant crowns thereby shifting competitive advantage to shade tolerant introduced grass species. Studies indicate that soil biological activity is altered, and this shift apparently exploits the soil microclimate and encourages growth of the introduced grass species. Once the threshold is crossed, a change in grazing management alone cannot cause a reduction in introduced grass species dominance. Preliminary studies would tend to indicate this threshold may exist when Kentucky bluegrass exceeds 30% of the plant community and native grasses represent less than 40% of the plant community composition.

Transition T2b
State 2 to 3

Heavy continuous season-long grazing is the primary driver of this transition. The very grazing tolerant species

have the competitive advantage during this transition. The opportunity for high intensity spring burns (which can serve to reduce the introduced cool-season species) is severely reduced by early green up and the lack of fuel. The nutrient cycle is impaired due to a shift from perennial native legumes to introduced biennial legumes and the lack of available carbon for soil biota due to accumulation in the surface layer root mat. These two factors result in reduced soil biological activity. Studies indicate that soil biological activity is altered, and this shift apparently exploits the soil microclimate and encourages growth of the introduced grass species. Once the threshold is crossed, a change in grazing management alone cannot cause a reduction in introduced grass species dominance. Preliminary studies would tend to indicate this threshold may exist when Kentucky bluegrass exceeds 30% of the plant community and native grasses represent less than 40% of the plant community composition.

Restoration pathway R3a
State 3 to 2

This restoration pathway may be initiated with the combination of prescribed burning followed by high levels of prescribed grazing management. The success of this restoration pathway depends on the presence of a remnant population of native grasses in community phase 3.1. This remnant population may not be readily apparent without close inspection. The application of prescribed burning may be needed at relatively short intervals in the early phases of this restoration process. However, the initial application of prescribed fire can have detrimental effects on remnant native bunchgrass crowns. Damage may be reduced by adjusting prescription parameters. Some previous efforts have shown promise with early season prescribed burning; however, fall burning may also be effective under certain circumstances. Both prescribed grazing and prescribed burning are necessary to successfully initiate this restoration pathway.

Restoration pathway R3b
State 3 to 2

It may be possible using selected plant materials and agronomic practices to approach something very near the functioning of the Native/Invaded State (State 2). Application of chemical herbicides and the use of mechanical seeding methods using adapted varieties of the dominant native grasses are possible and can be successful. After establishment of the native grasses, management objectives must include the maintenance of those species, the associated reference state functions and continued treatment of the introduced sodgrasses.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Tall Warm-season Grasses**			538–897	
	big bluestem	ANGE	*Andropogon gerardii*	179–538	–
	sand bluestem	ANHA	*Andropogon hallii*	179–538	–
	prairie sandreed	CALO	*Calamovilfa longifolia*	179–538	–
	switchgrass	PAVI2	*Panicum virgatum*	72–359	–
	Indiangrass	SONU2	*Sorghastrum nutans*	36–179	–
	prairie cordgrass	SPPE	*Spartina pectinata*	0–72	–
2	**Cool-season Bunchgrasses**			179–538	
	porcupinegrass	HESP11	*Hesperostipa spartea*	179–538	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	36–179	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	36–179	–
	Canada wildrye	ELCA4	*Elymus canadensis*	0–108	–
3	**Mid Warm-season Grasses**			179–538	
	little bluestem	SCSC	*Schizachyrium scoparium*	179–538	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	72–359	–

	sand dropseed	SPCR	*Sporobolus cryptandrus*	36–179	–
4	**Mid Cool-season Grasses**			72–179	
	northern reedgrass	CASTI3	*Calamagrostis stricta ssp. inexpansa*	0–179	–
	western wheatgrass	PASM	*Pascopyrum smithii*	36–179	–
5	**Short Warm-season Grasses**			36–179	
	blue grama	BOGR2	*Bouteloua gracilis*	36–179	–
	mat muhly	MURI	*Muhlenbergia richardsonis*	0–72	–
6	**Other Native Grasses**			36–179	
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	36–179	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	36–108	–
	Scribner's rosette grass	DIOLS	*Dichanthelium oligosanthes var. scribnerianum*	0–72	–
	fall rosette grass	DIWI5	*Dichanthelium wilcoxianum*	0–72	–
7	**Grass-likes**			72–359	
	sun sedge	CAINH2	*Carex inops ssp. heliophila*	36–287	–
	Pennsylvania sedge	CAPE6	*Carex pensylvanica*	36–287	–
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	0–108	–
Forb					
8	**Forbs**			179–359	
	white sagebrush	ARLU	*Artemisia ludoviciana*	36–108	–
	flat-top goldentop	EUGR5	*Euthamia graminifolia*	36–72	–
	Maximilian sunflower	HEMA2	*Helianthus maximiliani*	36–72	–
	stiff goldenrod	OLRI	*Oligoneuron rigidum*	36–72	–
	Missouri goldenrod	SOMI2	*Solidago missouriensis*	36–72	–
	white heath aster	SYER	*Symphyotrichum ericoides*	36–72	–
	longbract spiderwort	TRBR	*Tradescantia bracteata*	36–72	–
	purple prairie clover	DAPU5	*Dalea purpurea*	36–72	–
	silky prairie clover	DAVI	*Dalea villosa*	36–72	–
	smooth horsetail	EQLA	*Equisetum laevigatum*	0–36	–
	narrowleaf stoneseed	LIIN2	*Lithospermum incisum*	0–36	–
	lobelia	LOBEL	*Lobelia*	0–36	–
	rush skeletonplant	LYJU	*Lygodesmia juncea*	0–36	–
	prairie milkweed	ASSU3	*Asclepias sullivantii*	0–36	–
	Forb, native	2FN	*Forb, native*	0–36	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–36	–
Shrub/Vine					
9	**Shrubs**			179–359	
	prairie willow	SAHU2	*Salix humilis*	36–143	–
	white meadowsweet	SPAL2	*Spiraea alba*	36–108	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–108	–
	prairie rose	ROAR3	*Rosa arkansana*	36–108	–
	western snowberry	SYOC	*Symphoricarpos occidentalis*	36–72	–

Animal community

Animal Community – Wildlife Interpretations
Major Land Resource Area (MLRA) 55B lies within the Northern mixed-grass prairie ecosystem. Prior to European settlement, this area consisted of diverse grassland habitats interspersed with varying densities of depressional wetlands and limited woody riparian corridors. These habitats provided critical life cycle components for many of its users. Many species of grassland birds and herds of roaming bison, elk, and pronghorn were among the inhabitants. These species, as well as several small mammal and insect species, were the primary consumers linking the grassland resources to predators such as wolves, mountain lions, and grizzly bears as well as smaller carnivores such as coyotes, bobcats, foxes and raptors. In addition, a wide variety of small mammals, reptiles, amphibians and insects were adapted to this semi-arid climate.

Historically, the Northern mixed-grass prairie was a disturbance-driven ecosystem with fire, herbivory and climate functioning as the primary disturbance factors either singly or in combination. Following European settlement, widespread conversion to cropland, elimination of fire, and habitat fragmentation influenced species composition and abundance. Introduced and invasive species further impacted plant and animal communities. Bison were historically a keystone species but have been extirpated as a free-ranging herbivore. The loss of bison and fire as ecological drivers greatly influenced the character of the remaining native plant community and the habitats that they provide. Fragmentation has reduced habitat quality for area-sensitive species.

Animal Community – Grazing Interpretations
This site is well adapted to managed grazing by domestic livestock. The predominance of herbaceous plants across all plant community phases best lends these sites to grazing by cattle but other domestic grazers with differing diet preferences may also be a consideration depending upon management objectives. Often, the current plant community does not entirely match any particular plant community (as described in the ecological site description). Because of this, a resource inventory is necessary to document plant composition and production. Proper interpretation of this inventory data will permit the establishment of a safe, initial stocking rate for the type and class of animals and level of grazing management. More accurate stocking rate estimates should eventually be calculated using actual stocking rate information and monitoring data.

Hydrological functions

Water is not a principal factor limiting herbage production early in the season when the water table is high. The water table can drop later in the growing season and limit further herbage production on this site. The site is dominated by soils in hydrologic groups A and B. Infiltration varies from very rapid to rapid and runoff potential varies from negligible to low depending on soil hydrologic group and ground cover. In many cases, areas with greater than 75% ground cover have the greatest potential for high infiltration and lower runoff. An 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 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.

Contributors

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Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

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Date	06/21/2012
Approved by	Jeff Printz
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None.

2. **Presence of water flow patterns:** None.

3. **Number and height of erosional pedestals or terracettes:** None.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is < 5%.

5. **Number of gullies and erosion associated with gullies:** None.

6. **Extent of wind scoured, blowouts and/or depositional areas:** None.

7. **Amount of litter movement (describe size and distance expected to travel):** None.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil surface fragments will typically retain structure indefinitely when dipped in distilled water. Stability averages 5 to 6.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Use soil series description for depth, color and structure of A horizon/surface layer.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Combination of shallow and deep rooted species (mid & tall rhizomatous and tufted perennial cool-and warm-season grasses) with fine and coarse roots positively influences infiltration.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None.

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant: Tall, warm-season rhizomatous grasses >

    Sub-dominant: Mid, cool-season bunchgrasses = mid, warm-season grasses >

    Other: Forbs = shrubs = mid and short cool-season grasses = grass-likes > short, warm-season grasses

    Additional: Following prolonged periods of drought, the short, warm-season grasses F/S group may become a sub-dominant.

    Due to differing root structure and distribution, Kentucky bluegrass and smooth bromegrass do not fit into reference plant community F/S groups.

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** None.

14. **Average percent litter cover (%) and depth (in):** Plant litter is in contact with soil surface.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Representative value (RV) = 3200 lbs/ac air dry with a range of 2400 to 4000 lbs/ac air dry depending upon growing conditions.

16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** State/local noxious, Kentucky bluegrass, smooth bromegrass, Russian olive, Siberian elm

17. **Perennial plant reproductive capability:** All species exhibit high vigor relative to climatic conditions. Do not rate based solely on seed production. Perennial grasses should have vigorous rhizomes or tillers.