USDA Natural Resources Conservation Service

Ecological site R055BY068ND
Thin Loamy

Accessed: 05/19/2024

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.

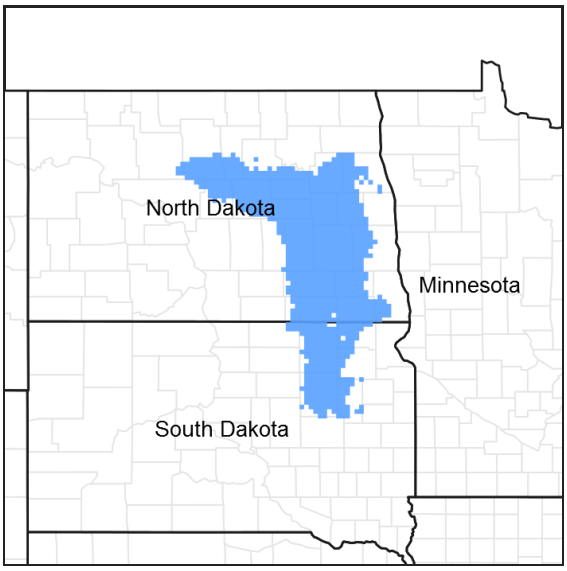


Figure 1. Mapped extent

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.

Classification relationships

Level IV Ecoregions of the Conterminous United States: 46c – Glacial Lake Basins; 46d – Glacial Lake Deltas; 46e – Tewaukon Dead Ice Moraine; 46f – End Moraine Complex; 46i – Drift Plains; 46j – Glacial Outwash; 46n – James River Lowland.

Associated sites

R055BY056ND	**Clayey**
R055BY059ND	**Loamy Overflow**
R055BY062ND	**Sandy**
R055BY063ND	**Shallow Gravel**
R055BY064ND	**Loamy**

Similar sites

R055BY064ND	**Loamy** (055BY064ND) – Loamy (Ly) Found on dry uplands, upslope from Loamy Overflow site, down slope from Thin Loamy or Shallow Loamy sites; similar landscape position as Sandy, Sands, Clayey sites. Will ribbon greater than 1 inch and up to 2 inches. Indicator species are western wheatgrass, green needlegrass and blue grama, with fringed sagewort and western snowberry being the dominant shrubs. Higher production, different landscape position, less little bluestem, plains muhly, and sideoats grama, more western wheatgrass and green needlegrass.]

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Schizachyrium scoparium* (2) *Hesperostipa spartea*

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
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)	140 days
Freeze-free period (average)	161 days

Precipitation total (average)	533 mm

Influencing water features

No significant water features influence this site.

Soil features

These are very deep, moderately well to well drained, and moderately coarse to moderately fine textured soils. These soils have strongly calcareous subsoil or are calcareous to the surface. Saturated hydraulic conductivity is moderate to moderately slow and available water capacity is high. Salinity is none and sodicity is none. This site is on side slopes or ridges on gently sloping to very steep residual uplands and till plains. Slope ranges from 0 to 60 percent. It is not uncommon to have some pedestalling of plants due to the inherent instability of the soils. Water flow paths are broken, irregular in appearance or discontinuous. There is a risk of rills and eventually gullies if vegetative cover is not adequate. Cryptobiotic crusts are present. Sub-surface soil layers are non-restrictive to water movement and root penetration.

These soils are highly susceptible to water erosion and to a lesser degree wind erosion. The hazard of water erosion increases where vegetative cover is not adequate. Loss of the soil surface layer can result in a shift in species composition and/or production.

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:

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

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

Table 4. Representative soil features

Surface texture	(1) Loam (2) Silt loam (3) Silty clay loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Moderately slow to moderate
Soil depth	51–203 cm
Surface fragment cover <=3"	0–10%
Surface fragment cover >3"	0–50%
Available water capacity (0-101.6cm)	22.86–30.48 cm
Calcium carbonate equivalent (0-101.6cm)	0–45%
Electrical conductivity (0-101.6cm)	0–4 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–15%

Subsurface fragment volume >3" (Depth not specified)	0–10%

Ecological dynamics

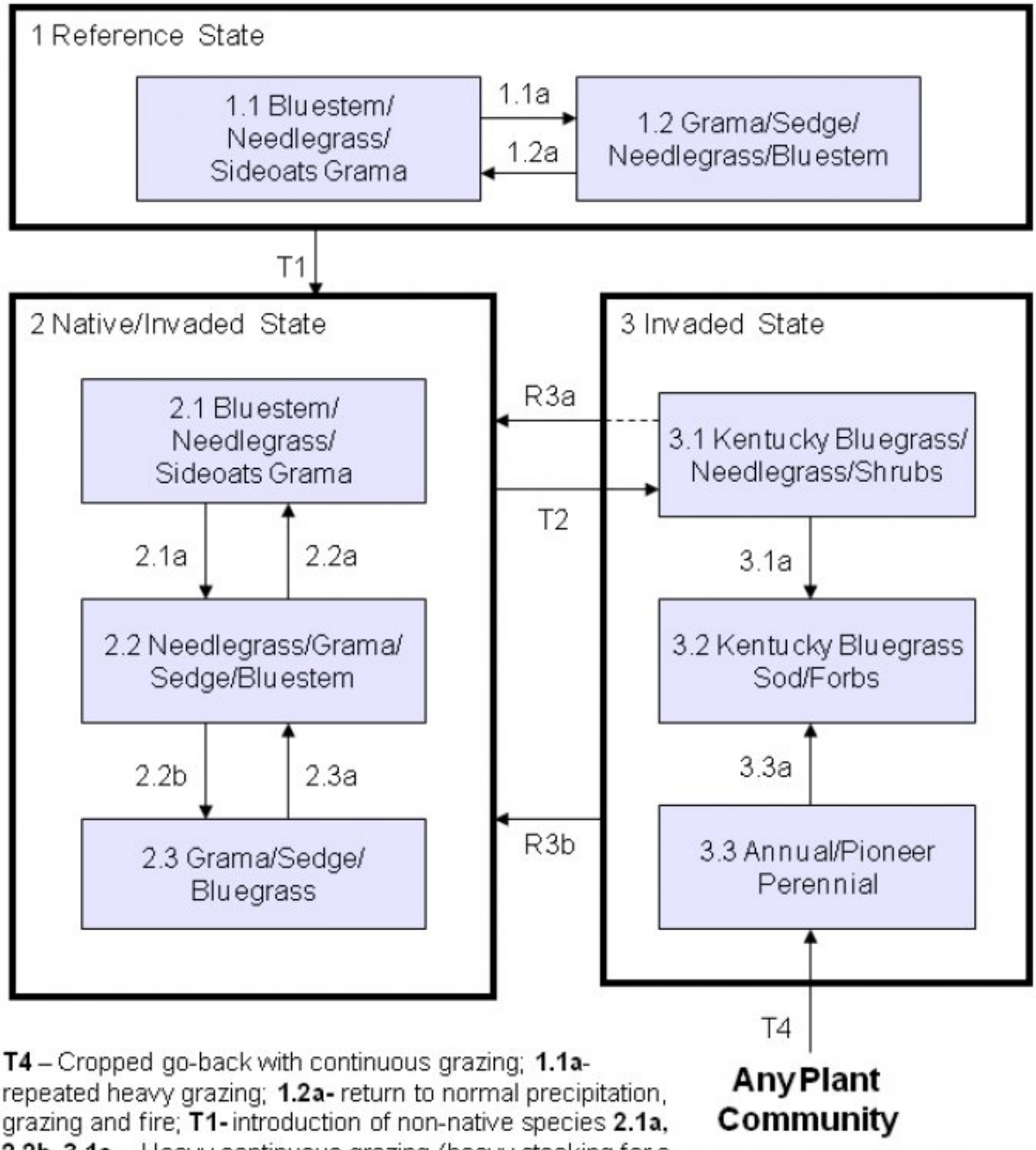
The site developed under Northern Great Plains climatic conditions, and included natural influence of large herding herbivores and frequent fire. Changes will occur in the plant communities due to weather fluctuations and/or management actions. Under adverse impacts, a slow decline in vegetative vigor and composition will occur. Under favorable conditions the site has the potential to resemble the reference state. Interpretations for this site are based on 1.1 Bluestem/ Needlegrass/ Sideoats Grama plant community. The 1.1 Bluestem/Needlegrass/Sideoats Grama 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. Lightening 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. Species such as western wheatgrass and blue grama and, if present, Kentucky bluegrass will initially increase. Little bluestem will initially remain in the plant community but will decline with continued disturbance. Western wheatgrass will increase initially and then begin to decrease. Porcupine grass and/or green needlegrass, plains muhly and sideoats grama will decrease in frequency and production. In time, heavy continuous grazing will likely cause upland sedges and blue grama and/or Kentucky bluegrass if present to dominate and pioneer perennials and annuals to increase. The resulting plant community is relatively stable and competitive advantage prevents other species from establishing. 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. Remnant little bluestem plants may be present but are reduced in vigor. Shrubs such as western snowberry and silverberry increase in this situation, especially in areas prone to snow accumulation and drift.

Following the state and transition diagram are narratives for each of the described states and community phases. These may not represent every possibility, but they are the most prevalent and repeatable states/community phases. The plant composition tables shown below have been developed from the best available knowledge at the time of this revision. As more data are collected, some of these community phases and/or states may be revised or removed, and new ones may be added. The main purpose for including the descriptions here is to capture the current knowledge and experience at the time of this revision.

State and transition model



T4 – Cropped go-back with continuous grazing; **1.1a**- repeated heavy grazing; **1.2a-** return to normal precipitation, grazing and fire; **T1-** introduction of non-native species **2.1a, 2.2b, 3.1a** – Heavy continuous grazing (heavy stocking for a majority of the growing season) **2.2a, 2.3a** - prescribed grazing; **T2** – Extended period of non-use & no fire; **3.3a**- grazing and time; **R3a** – Prescribed burning, and prescribed grazing; **R3b** – Range seeding with prescribed grazing.

State 1
Reference

This state represents the natural range of variability that dominated the dynamics of this ecological site. Historically, this state was dominated by mid statured warm and cool season bunch grasses. The primary disturbance mechanisms for this site in the reference condition included frequent fire and grazing by large herding ungulates. Timing of fires and grazing coupled with weather events dictated the dynamics that occurred within the natural range of variability. Dominance would have shifted between the warm/cool season mid statured bunchgrass phase and the short statured warm season/grass-like phase due to changes in precipitation patterns, fire frequency, and grazing frequency/intensity Individual species would have varied greatly in production depending on growing conditions (timing and amount of precipitation and temperature). 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/Sideoats Grama

This plant community phase consisted of about 85% grasses or grass-like plants, 10% forbs and 5% shrubs. Little bluestem, porcupine grass, green needlegrass and sideoats grama dominated this plant community phase with lesser amounts of needleandthread, plains muhly, Canada wildrye, prairie junegrass, blue grama and red threeawn. Minor amounts of big bluestem and prairie sandreed would have been present. Major forbs and shrubs included American vetch, gayfeather, goldenrods, prairie coneflower, scurfpea, western yarrow, fringed sagewort, leadplant and rose. This represents the plant community phase upon which interpretations are primarily based. Community dynamics, nutrient cycling, water cycle and energy flow were functioning at near optimum levels. Dominance by 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	1407	2195	3430
Forb	118	185	252
Shrub/Vine	45	86	129
Total	**1570**	**2466**	**3811**

Figure 5. Plant community growth curve (percent production by month). ND5504, Central Black Glaciated Plains, warm-season dominant, cool-season sub-dominant.. 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

Community 1.2
Grama/Sedge/Needlegrass/Bluestem

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. Big bluestem, little bluestem, sideoats grama, western wheatgrass and the needlegrasses were reduced in amount but were still present within the plant community. Less palatable forbs such as silverleaf scurfpea, cudweed sagewort, prairie coneflower and green sagewort become more prevalent in the plant community. Shrubs such as fringed sagewort and broom snakeweed would have been the principal shrubs. The shift to the shallower rooted, short statured blue grama and sedges coupled with an increase in bare ground results in lower infiltration rates and higher soil surface temperatures as compared to plant community phase 1.1. This reduction in infiltration would have resulted in a short term increase in the number and

size of water flow patterns. While the timing of energy capture would have remained similar to that of plant community phase 1.1, total energy capture may have been slightly reduced due to a decrease in overall leaf area.

Figure 6. Plant community growth curve (percent production by month). ND5504, Central Black Glaciated Plains, warm-season dominant, cool-season sub-dominant.. 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

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 short stature grasses such as blue grama and upland sedges. This shift may have been facilitated by periods of below normal precipitation.

Pathway 1.2a
Community 1.2 to 1.1

A return to normal precipitation patterns, grazing and fire regime allows for recovery of mid statured cool and warm-season grasses.

State 2
Native/Invaded

This state is 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 and cool season bunch grass 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. Timing of fires and grazing coupled with weather events dictate the dynamics that occur within this state. The warm-season native grass can decline and an increase in introduced sod grasses will occur. Many times, this state appears as a mosaic of community phases caused primarily by continuous season-long grazing.

Community 2.1
Bluestem/Needlegrass/Sideoats Grama

This community phase most closely resembles plant phase 1.1in appearance and ecological functions (e.g., hydrologic, biotic and soil/site stability). The warm-season 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 is dominated by mid warm-season and mid cool-season bunch grasses such as little bluestem, porcupine grass, needleandthread, and sideoats grama. Other grass and grass-likes species occurring include green needlegrass, prairie Junegrass, western wheatgrass, slender wheatgrass, bearded wheatgrass, blue grama, and sedge. Grasses and grass-like species comprise about 85% of the plant community production. A variety of leguminous and non-leguminous perennial forbs include such as prairie coneflower, gayfeather, scurfpea and goldenrod. Forbs would constitute about 10% of the plant community. Shrubs such as leadplant, rose and fringed sagewort would comprise about 5% of the plant community. The ecological processes are functioning at levels very close to those of plant community phase 1.1. Slight departure might be noted within the functional/structural indicator due to the present of a functional/structural group(s) not expected for the site. 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 leguminous species such as sweet clover may be a causative factor leading to the eventual dominance of cool-season introduced grasses in the Invaded State.

Figure 7. Plant community growth curve (percent production by month). ND5504, Central Black Glaciated Plains, warm-season dominant, cool-season sub-dominant.. 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

Community 2.2
Needlegrass/Grama/Sedge/Bluestem

Cool season bunch grasses such as porcupine grass and needleandthread become dominant as the mid statured warm season bunch grasses succumb to the pressure of heavy late season grazing. Kentucky bluegrass will begin to increase. This community phase is often dispersed throughout the site, 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, season-long grazed pastures. 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 shifts toward the grazing tolerant short statured species such as Kentucky bluegrass, blue grama, and sedge. Common forbs within this plant community phase include; prairie coneflower, scurfpea, goldenrod, heath aster, green sagewort, cudweed sagewort and wavyleaf thistle. Leadplant, rose and fringed sage are the principal shrubs. Energy capture for this plant community phase would shift to earlier in the growing season due to the increased presence of cool season grasses. As blue grama and sedges become more dominant, infiltration rates would begin to decrease and runoff would increase. A shift in the dominant functional/structural group would also be noted with the mid statured warm season bunchgrasses being replaced by the mid statured cool season bunchgrasses.

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

Community 2.3
Grama/Sedge/Bluegrass

This plant community shift results from heavy continuous or heavy continuous season-long grazing over a period of several years. Blue grama becomes the dominant grass with lesser amounts of upland sedges and Kentucky bluegrass. These grazing tolerant short statured grasses and grass-likes out compete and replace species such as big bluestem, little bluestem, western wheatgrass and the needlegrasses. Common forbs would include goldenrod, green sagewort, western salsify, heath aster, western yarrow, scurfpea and western ragweed. Fringed sagewort, and prairie rose are the principal shrubs. The shift in the plant community composition results in changes to how the ecological processes function on this site. Infiltration for this plant community phase is reduced when compared to plant community phases 1.1 and 2.1. Since the ratio of warm-season to cool-season plants within this community phase is similar to 2.1, the timing of energy capture is not altered but overall energy capture would be less due to the reduction in total leaf surface area available to capture solar energy. This plant community phase represents an “at risk” plant community. Due to the amount of Kentucky bluegrass present and the reduced competitive abilities of the associated native species, the possibility exists for this community to cross a threshold and transition to State 3, Invaded State. Therefore, caution needs to be applied when developing and implementing restoration strategies for this plant community phase.

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

Pathway 2.1a
Community 2.1 to 2.2

Heavy continuous grazing or heavy late seasonal grazing will shift this plant community from a dominance of warm season bluestems to a dominance of cool season needlegrasses and sedges.

Pathway 2.2a
Community 2.2 to 2.1

Prescribed grazing with adequate recovery periods will shift the competitive advantage to the mid statured warm season bunch grasses.

Pathway 2.2b
Community 2.2 to 2.3

Heavy continuous grazing or heavy continuous season-long grazing allows the grazing tolerant short stature grasses and sedges to become more competitive and dominant

Pathway 2.3a
Community 2.3 to 2.2

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 mid warm and cool-season bunchgrass species. Kentucky bluegrass will remain in this community at varying amounts dependant on the level of management. Caution should be exercised when initiating this restoration pathway to ensure the Kentucky bluegrass doesn't increase, resulting in unexpectedly crossing the threshold to State 3, Invaded State.

State 3
Invaded

This state is the result of invasion and dominance of Kentucky bluegrass and/or smooth bromegrass. This state is characterized by these two species and an increasing litter layer that effectively blocks introduction of other plants into the system and/or prevents existing native plants from effectively competing for resources. Once this state is well established, even drastic events such as high intensity fires driven by high fine fuel loads of litter will not result in more than a very short term reduction of these two species. These events may reduce the dominance of the 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 sodgrasses rebound and again dominate the system.

Community 3.1
Kentucky Bluegrass/Smooth Bromegrass/Needlegrass/Shrubs

This plant community is dominated by Kentucky bluegrass (60 to 70% of total production) but remnants of little bluestem and porcupine grass are still present. Forbs, such as goldenrod, heath aster, scurfpea, and prairie coneflower may make up to 5 to 15% of the production. Shrubs including silverberry and western snowberry are present making up as much as 20 to 35% of the total production. With continued non-use, smooth bromegrass may increase, becoming the dominant herbaceous component. The presence of a thick litter layer is common for this plant community phase. This heavy litter layer intercepts sunlight and cools the soil surface, favoring the shade tolerant cool-season invasive grasses and shrubs. The thick litter layer also intercepts precipitation from small rainfall events making them ineffective for plant growth. Initial infiltration rates may be similar to the reference plant community. However, field observations have noted that the root mat formed by the Kentucky bluegrass sod tends to be hydrophobic until completely saturated. In addition, due to the shallow rooting depth of the dominant species, infiltration rates will decline as downward movement of water is limited by reduced soil porosity below the rooting zone. Energy capture is shifted to early May through mid June and is reduced due to the high amount of plant litter and reduced plant vigor.

Figure 10. 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 Sod/Forbs

This plant community is dominated by Kentucky bluegrass. Forbs may include western ragweed, goldenrod, pussytoes, gumweed, and green sage. Shrubs would include fringed sagewort and western snowberry. Due to the continuous, heavy grazing pressure, Kentucky bluegrass forms a dense sod. This dense Kentucky bluegrass sod greatly reduces infiltration and increases runoff. Due to the lack of bare ground and the dense sod, soil erosion is minimal. However, due to higher runoff, gullies may form on adjacent sites such as loamy and loamy overflow. Energy capture is shifted to early May through mid June.

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 3.3
Annual/Pioneer/Non-Native Perennial

The 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, introduced cool-season perennial grasses and possibly invasive noxious weeds will begin to establish on this site.

Pathway 3.1a
Community 3.1 to 3.2

Heavy continuous grazing or heavy continuous season-long grazing will result in a shift to plant community phase 3.2.

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.

Transition T1
State 1 to 2

This is the transition from the native warm-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 warm and cool season bunch 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 from any plant community, being applied on this ecological site.

Transition T4
State 1 to 3

This transition occurs with cessation of cropping practices from any plant community, being applied on this ecological site.

Transition T4
State 2 to 3

This transition occurs with cessation of cropping practices from any plant community, being applied on this ecological site.

Transition T4
State 2 to 3

This transition occurs with cessation of cropping practices from any plant community, being applied on this ecological site.

Transition T4
State 2 to 3

This transition occurs with cessation of cropping practices from any plant community, being applied on this ecological site.

Transition T2
State 2 to 3

Non-use and no fire. Lack of disturbances shifts the competitive advantage to the non-native species.

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. 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. Caution with the first series of burns is needed so as not to damage crowns of remnant native grasses.

Restoration pathway R3b
State 3 to 2

This pathway requires the use of range seeding using native species adapted to this site. 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, possibly in conjunction with prescribed burning, 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 or the seeding will revert to 3.1.

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	**Mid Warm-season Grasses**			247–912	
	little bluestem	SCSC	*Schizachyrium scoparium*	370–616	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	49–173	–
	plains muhly	MUCU3	*Muhlenbergia cuspidata*	25–123	–
2	**Needlegrass**			247–616	
	porcupinegrass	HESP11	*Hesperostipa spartea*	123–616	–
	green needlegrass	NAVI4	*Nassella viridula*	123–247	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	49–247	–
	shortbristle needle and thread	HECU9	*Hesperostipa curtiseta*	0–123	–
3	**Tall Warm-season Grasses**			49–197	
	big bluestem	ANGE	*Andropogon gerardii*	25–197	–
	prairie sandreed	CALO	*Calamovilfa longifolia*	25–197	–
4	**Other Native Grasses**			25–247	
	Grass, perennial	2GP	*Grass, perennial*	0–123	–
	blue grama	BOGR2	*Bouteloua gracilis*	25–123	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	25–123	–
	western wheatgrass	PASM	*Pascopyrum smithii*	49–123	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	25–49	–
	Fendler threeawn	ARPUL	*Aristida purpurea var. longiseta*	0–49	–
	spikeoat	AVHO3	*Avenula hookeri*	0–49	–
5	**Grass-likes**			25–123	
	sedge	CAREX	*Carex*	25–123	–
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	0–49	–
Forb					
6	**Forbs**			123–247	
	Forb, perennial	2FP	*Forb, perennial*	0–74	–
	blacksamson echinacea	ECAN2	*Echinacea angustifolia*	0–74	–
	stiff sunflower	HEPA19	*Helianthus pauciflorus*	25–49	–
	blazing star	LIATR	*Liatris*	25–49	–
	scurfpea	PSORA2	*Psoralidium*	25–49	–
	cutleaf anemone	PUPAM	*Pulsatilla patens ssp. multifida*	25–49	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	25–49	–
	goldenrod	SOLID	*Solidago*	25–49	–
	western yarrow	ACMIO	*Achillea millefolium var. occidentalis*	25–49	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	0–49	–
	Forb, annual	2FA	*Forb, annual*	0–49	–
	prairie clover	DALEA	*Dalea*	25–49	–
	lacy tansyaster	MAPI	*Machaeranthera pinnatifida*	25–49	–

	American vetch	VIAM	*Vicia americana*	25–49	–
	large Indian breadroot	PEES	*Pediomelum esculentum*	0–25	–
	spiny phlox	PHHO	*Phlox hoodii*	0–25	–
	milkvetch	ASTRA	*Astragalus*	0–25	–
	wavyleaf thistle	CIUN	*Cirsium undulatum*	0–25	–
	onion	ALLIU	*Allium*	0–25	–
	pussytoes	ANTEN	*Antennaria*	0–25	–
	field sagewort	ARCA12	*Artemisia campestris*	0–25	–
	white heath aster	SYER	*Symphyotrichum ericoides*	0–25	–
	rush skeletonplant	LYJU	*Lygodesmia juncea*	0–25	–
Shrub/Vine					
7	**Shrubs**			49–123	
	leadplant	AMCA6	*Amorpha canescens*	25–74	–
	prairie sagewort	ARFR4	*Artemisia frigida*	25–49	–
	silverberry	ELCO	*Elaeagnus commutata*	0–49	–
	rose	ROSA5	*Rosa*	25–49	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–25	–
	dwarf false indigo	AMNA	*Amorpha nana*	0–25	–
	Saskatoon serviceberry	AMAL2	*Amelanchier alnifolia*	0–25	–

Animal community

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 the principal factor limiting herbage production on this site. The site is dominated by soils in hydrologic group B, with localized areas in hydrologic group C. Infiltration varies from moderately slow to moderate and runoff potential for this site varies from low to high depending on soil hydrologic group, slope 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 variety 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.

Inventory data references

Information presented here has been derived from NRCS and other federal/state agency clipping and 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; Kevin Sedivec, Extension Rangeland Management Specialist; Shawn Dekeyser, North Dakota State University; Rob Self, The Nature Conservancy and Lee Voigt, NRCS Range Management Specialist.

There are 23 SCS-RANGE-417's collected from 1968-1973 in four North Dakota counties.

Other references

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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.

Author(s)/participant(s)	Jeff Printz, Stan Boltz, Lee Voigt, Jody Forman
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Date	02/10/2012
Approved by	Jeff Printz
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None on slopes less than 25%. On slopes > 25% rills may be visible but are short (12 to 20 inches) and discontinuous.

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2. **Presence of water flow patterns:** None on slopes <25%. May be observable on slopes greater than 25% but are relatively short (several feet or less in length) and not connected.

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3. **Number and height of erosional pedestals or terracettes:** Not observable on slopes < 25%. Some pedestalling evident on slopes > 25% with occassonal terracettes.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is 10% or less. Patches less than 2 inches in diameter.

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

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

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7. **Amount of litter movement (describe size and distance expected to travel):** Plant litter remains in place on slopes < 25%. Slight movement may be visible following intense thunderstorm events particularly after extended periods of below normal precipitation. On slopes >25%, short movement (< 24 inches) of fine plant litter may be visible and litter debris dams are occasionally present.

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

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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.

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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.

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

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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: Mid warm-season grasses >

Sub-dominant: Mid cool-season bunchgrasses >

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

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

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

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

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Representative value = 2200 lbs/ac air dry with a range of 1400 to 3400 lbs/acre depending on growing conditions.

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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 weeds, Kentucky bluegrass, smooth bromegrass, Eastern red cedar

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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.
