USDA Natural Resources Conservation Service

Ecological site R055DY002SD
Linear Meadow

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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.

MLRA notes

Major Land Resource Area (MLRA): 055D–Glacial Lake Dakota

MLRA 55D is in South Dakota (92 percent) and southeastern North Dakota (8 percent). It makes up about 3,059 square miles (7,923 square kilometers). This area, which is part of the glacial till plain region, consists of a large, glacial lake plain that was drained by the James River, which flows southward through the area. The MLRA is dominantly farmland converted from prairie, but some areas of grassland remain. Agricultural drainage practices have impacted shallow depressions in many areas.

MLRA 55D has distinct boundaries. Till plains are on all sides. MLRA 55B borders the area largely to the north and is also between the Lake Dakota Plain and two prominent coteaus—the Missouri Coteau on the west and the Prairie Coteau on the east. To the south is MLRA 55C (Southern Black Glaciated Plains), which has a mesic soil temperature regime.

This area is in the Central Lowland province of the Interior Plains. Elevation ranges from 1,250 to 1,330 feet (380 to 405 meters), generally increasing from south to north. The area is characterized by mostly level to moderately sloping lake plains with many depressions and drainages. Much of the area has integrated drainage; drainage channels are poorly to moderately defined.

The glaciolacustrine sediments of the Lake Dakota Plain range from sandy to clayey and are commonly stratified. Some areas of the lake plain are mantled with wind-deposited materials, which are moderately coarse textured or sandy. Alluvial deposits and low terraces are common along the James River and its major tributaries but also occur in narrow and discontinuous strips along other streams.

Classification relationships

Major Land Resource Area (MLRA): Southern Black Glaciated Plains (55D) (USDA-NRCS, 2022)

USFS Sub-region: Located mainly within unit 332Bc and 332Ba (Cleland et al., 2007).

Ecological site concept

The Linear Meadow ecological site is located on flood plains and outwash plans with long frequent flooding events. The elevation is between one and two thousand feet with 0-1% slopes. The reference community is dominated by grass and grass types such as sedges. Forbes are common as well. These are very deep, poorly and very poorly drained, medium to fine textured soils. Salinity and sodicity are none to slight. Water tables on this site range from the surface to about 20 inches below the surface during most of the growing season.

Associated sites

R055DY003SD	**Subirrigated** Subirrigated - This site occurs in swales and blow-outs. It has redoximorphic features at a depth of 18 to 30 inches. All textures are included in this site.
R055DY001SD	**Shallow Marsh** Shallow Marsh [less prairie cordgrass, whitetop co-dominant; higher production]
R055DY004SD	**Wet Meadow** This site occurs in depressions and flats on uplands; it also occurs on floodplains. It is poorly drained - a seasonal high water table is typically within a depth of 1.5 feet during the months of April through June; in depressions, it is frequently ponded (typically <1.5) in April and May. It typically has redoximorphic features within a depth of 18 inches. Some soils are highly calcareous. E.C. is <8 in the surface and subsoil layers. All textures are included in this site.

Similar sites

R055DY001SD	**Shallow Marsh** Shallow Marsh [less prairie cordgrass, whitetop co-dominant; higher production]

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Carex aquatilis* (2) *Spartina pectinata*

Physiographic features

This site occurs on nearly level flood plains or drainageways.

Table 2. Representative physiographic features

Landforms	(1) Flood plain (2) Outwash plain
Runoff class	Very low
Flooding duration	Long (7 to 30 days)
Flooding frequency	None to occasional
Ponding duration	Very long (more than 30 days)
Ponding frequency	Frequent
Elevation	980–2,130 ft
Slope	0–1%
Ponding depth	12–35 in
Water table depth	0–15 in
Aspect	Aspect is not a significant factor

Climatic features

The average annual precipitation of MLRA 55D is 22 to 23 inches (549 to 594 millimeters). About 75 percent of the rainfall comes from high-intensity, convective thunderstorms during the growing season. Winter precipitation is typically snow. The average annual snowfall is 25 to 50 inches (635 to 1,270 millimeters). Strong winds commonly deposit the snow unevenly across the landscape. The average annual temperature is 43 to 45 degrees F (6 to 7 degrees C). The freeze-free period averages about 135 days and ranges from 120 to 150 days.

Table 3. Representative climatic features

Frost-free period (characteristic range)	114-117 days
Freeze-free period (characteristic range)	129-134 days
Precipitation total (characteristic range)	22-23 in
Frost-free period (actual range)	114-119 days
Freeze-free period (actual range)	127-134 days
Precipitation total (actual range)	22-23 in
Frost-free period (average)	116 days
Freeze-free period (average)	131 days
Precipitation total (average)	23 in

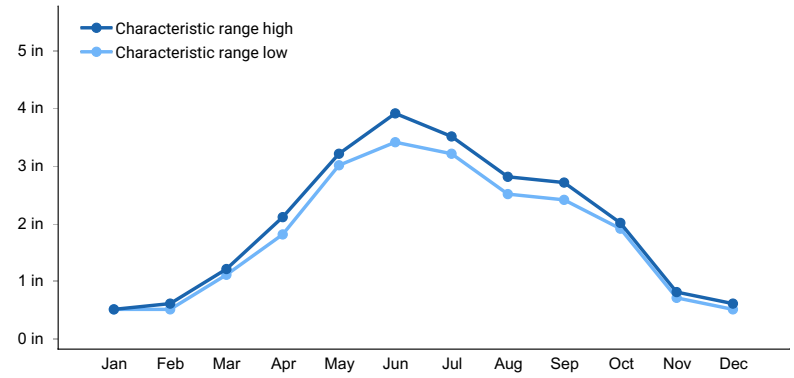


Figure 1. Monthly precipitation range

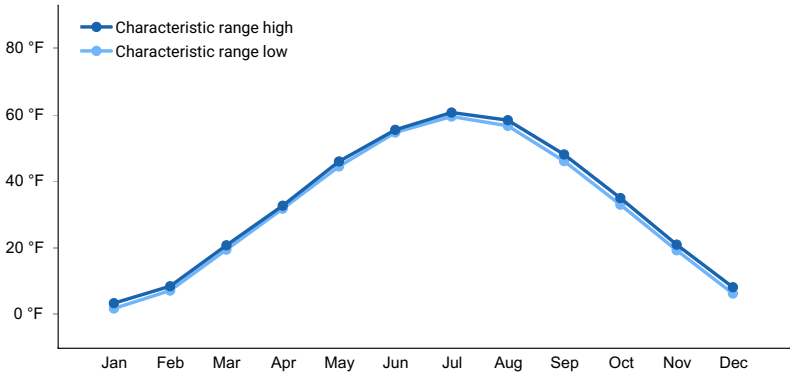


Figure 2. Monthly minimum temperature range

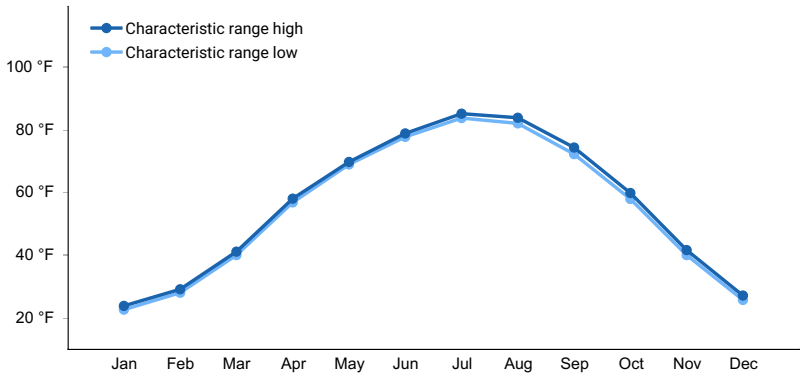


Figure 3. Monthly maximum temperature range

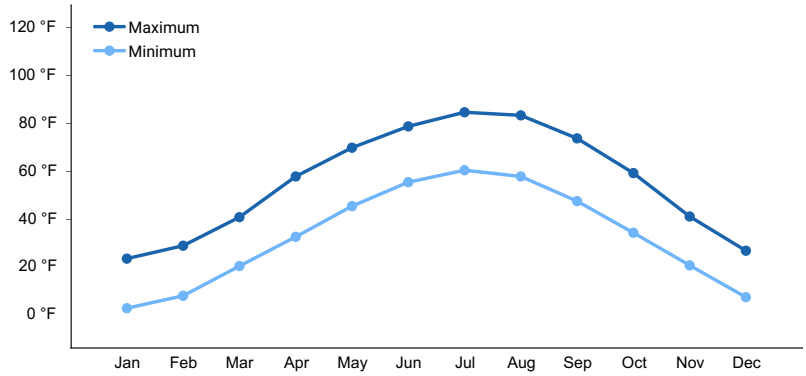


Figure 4. Monthly average minimum and maximum temperature

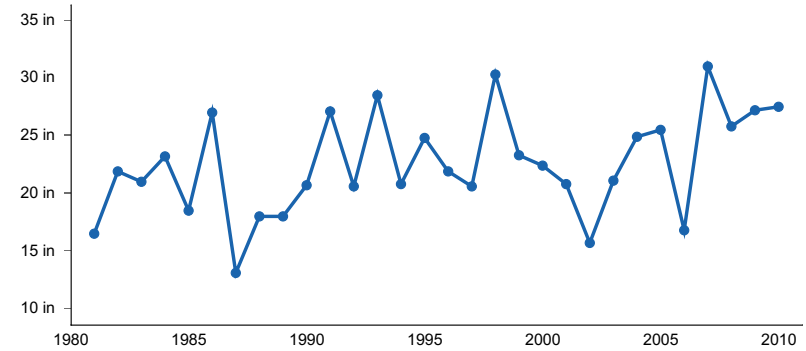


Figure 5. Annual precipitation pattern

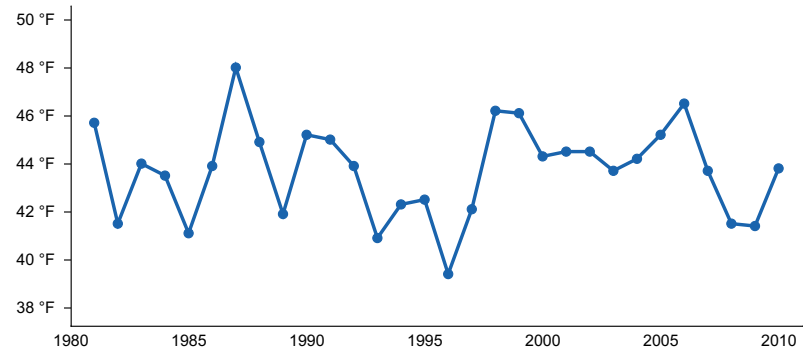


Figure 6. Annual average temperature pattern

Climate stations used

- (1) BRITTON [USC00391049], Britton, SD
- (2) ANDOVER #2 [USC00390120], Andover, SD
- (3) TURTON [USC00398420], Turton, SD
- (4) CONDE [USC00391917], Conde, SD
- (5) REDFIELD [USC00397052], Redfield, SD
- (6) MELLETTE 4 W [USC00395456], Northville, SD
- (7) ABERDEEN [USW00014929], Aberdeen, SD
- (8) COLUMBIA 8 N [USC00391873], Columbia, SD

Influencing water features

Runoff is very low resulting in frequent ponding. The high water table, flooding and slow permeability strongly influences the soil-water-plant relationship.

Wetland description

Although water may be present on this site, it is mostly a seasonal action and most often does not make this site a

true wetland.

Soil features

These are very deep, poorly and very poorly drained, medium to fine textured soils. Salinity and sodicity are none to slight. Water tables on this site range from the surface to about 20 inches below the surface during most of the growing season. This site occurs on flood plains and along drainageways. Slope ranges from zero to one percent. This site should show no evidence of rills, wind scoured areas or pedestalled plants. The soil surface is stable and intact. Subsurface soil layers are nonrestrictive to water movement and root penetration. The soils have a slow to moderately slow infiltration rate. These soils are not typically susceptible to water erosion. The high water table, flooding and slow permeability strongly influences the soil-water-plant relationship.

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

Table 4. Representative soil features

Surface texture	(1) Silty clay loam (2) Silty clay
Family particle size	(1) Loamy
Drainage class	Poorly drained
Permeability class	Slow to moderately slow
Depth to restrictive layer	80 in
Soil depth	80 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-60in)	5.5–7.2 in
Calcium carbonate equivalent (0-40in)	0–15%
Soil reaction (1:1 water) (0-40in)	5.9–8.1
Subsurface fragment volume <=3" (0-40in)	0–1%
Subsurface fragment volume >3" (0-40in)	0%

Ecological dynamics

This site developed under Northern Great Plains climatic conditions, light to severe grazing by bison and other large herbivores, sporadic natural or man-caused wildfire (often of light intensities), fluctuating water tables and flooding events, and other biotic and abiotic factors that typically influence soil/site development. Changes will occur in the plant communities due to short-term weather variations, impacts of native and/or exotic plant and animal species, and management actions. While the following plant community descriptions describe more typical transitions that will occur, severe disturbances, such as periods of well below average precipitation, can cause significant shifts in plant communities and/or species composition that may not be described within this document.

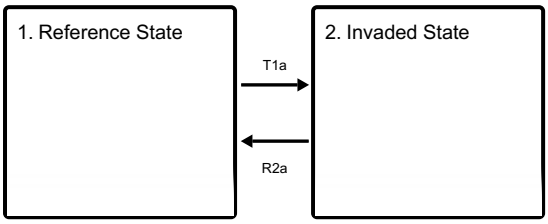
Heavy continuous grazing without adequate recovery periods following each grazing occurrence over several years causes this site to depart from the interpretive plant community. Species such as sedge and rush will initially increase. Prairie cordgrass, northern reedgrass, bluejoint reedgrass, and narrow reedgrass will decrease in frequency and production. Heavy continuous grazing causes reed canarygrass to increase and eventually dominate the site. Extended periods of nonuse and no fire will result in a plant community having high litter levels, which also favors an increase in reed canarygrass, spikerush and bluegrass.

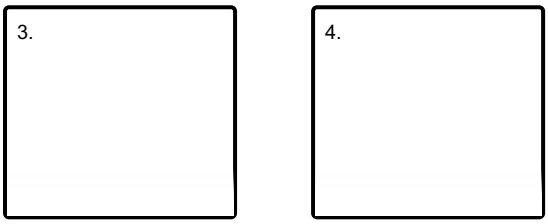
Interpretations are primarily based on the 1.1 Sedge/Prairie Cordgrass/Reedgrass Plant Community Phase. It has been determined by study of rangeland relic areas, areas protected from excessive disturbance, and areas under long-term rotational grazing regimes. Trends in plant community dynamics ranging from heavily grazed to lightly grazed areas, seasonal use pastures, and historical accounts also have been used. Plant community phases, states, transitional pathways, and thresholds have been determined through similar studies and experience.

The following is a diagram that illustrates the common plant community phases that can occur on the site and the transition pathways between communities. These are the most common plant community phases based on current knowledge and experience, and changes may be made as more data is collected. Narratives following the diagram contain more detail pertaining to the ecological processes.

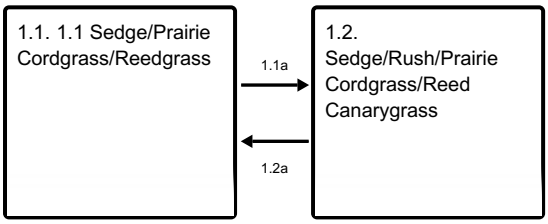
State and transition model

Ecosystem states

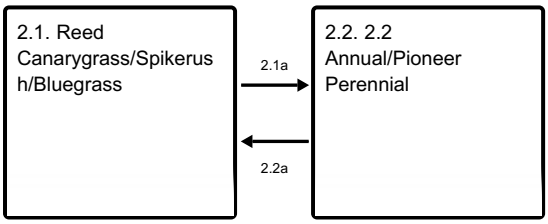




State 1 submodel, plant communities



State 2 submodel, plant communities



State 1
Reference State

The Linear Meadow site typically occurs in drainageways. The Reference State represents the natural range of variability that dominates the dynamics of this ecological site (ES). This state is typically co-dominated by cool-season grass and grass-like species, and warm-season grasses. Before European settlement in North America, the primary disturbance mechanisms for this site in the reference condition included sporadic fire and grazing by large herding ungulates. Ungulate grazing coupled with weather events dictated the dynamics that occurred within the natural range of variability. Today, the primary disturbance is from a lack of fire and concentrated livestock grazing. Grasses that are desirable for livestock and wildlife can decline and a corresponding increase in less desirable grasses will occur.

Dominant plant species

- prairie cordgrass (*Spartina pectinata*), grass
- northern reedgrass (*Calamagrostis stricta ssp. inexpansa*), grass
- bluejoint (*Calamagrostis canadensis*), grass
- reed canarygrass (*Phalaris arundinacea*), grass
- water sedge (*Carex aquatilis*), other herbaceous
- awlfruit sedge (*Carex stipata*), other herbaceous
- woolly sedge (*Carex pellita*), other herbaceous
- giant goldenrod (*Solidago gigantea*), other herbaceous
- New England aster (*Symphyotrichum novae-angliae*), other herbaceous
- Maximilian sunflower (*Helianthus maximiliani*), other herbaceous
- white panicle aster (*Symphyotrichum lanceolatum*), other herbaceous
- cinquefoil (*Potentilla*), other herbaceous
- broadfruit bur-reed (*Sparganium eurycarpum*), other herbaceous

Community 1.1
1.1 Sedge/Prairie Cordgrass/Reedgrass

This community evolved with grazing by large herbivores, occasional prairie fires and relatively frequent flooding and 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 40 percent grasses, 40 percent grass-like species, 15 percent forbs, and 5 percent shrubs by air-dry weight. Water sedge is typically the dominant grass-like species. Prairie cordgrass is the dominant tall warm-season grass occupying this plant community. Reedgrasses are the dominant tall cool-season species. A variety of sedges and rushes occur throughout this community as well as fowl mannagrass, switchgrass, reed canarygrass, plains bluegrass, and fowl bluegrass. Key forbs include broadfruit burreed, giant goldenrod, New England aster, Maximilian sunflower, white panicle aster, and cinquefoil. This plant community phase is diverse, stable, and productive, and is well adapted to the Northern Great Plains. The high water table supplies much of the moisture for plant growth. 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 the variability of both the fluctuations of water table and reoccurring flooding. This is a sustainable plant community in terms of soil stability, watershed function, and biologic integrity.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	4690	5220	5695
Forb	255	600	960
Shrub/Vine	55	180	345
Total	**5000**	**6000**	**7000**

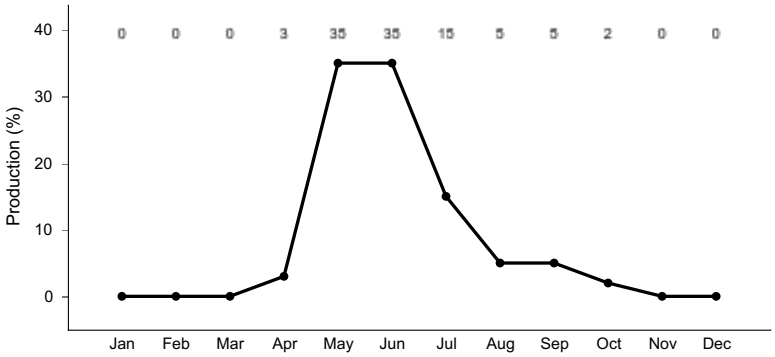


Figure 8. Plant community growth curve (percent production by month). ND5508, Central Black Glaciated Plains, lowland cool-season/warm-season co-dominant.. Cool-season, warm-season co-dominant, lowland..

Community 1.2

Sedge/Rush/Prairie Cordgrass/Reed Canarygrass

This community develops with periods of heavy continuous grazing with lack of adequate recovery periods during the growing season following periods of below normal precipitation. Lack of litter and reduced plant heights result in higher soil temperatures and reduced water infiltration rates. Recognition of this plant community will enable the land user to implement key management decisions before a significant ecological threshold is crossed. Prairie cordgrass has been reduced in this plant community, but still persists. Sedge, rush, and other grass-like species are dominant. The grass-like species have increased while the reedgrass species have been significantly reduced. Switchgrass may be removed at this stage. Reed canarygrass may begin to increase significantly. Forb species would include asters, goldenrod, and cinquefoil, as well as, a possible invasion of Canada thistle. Plant production and frequency have been reduced. The water cycle, nutrient cycle, and energy flow are slightly reduced but continue to function adequately.

Pathway 1.1a
Community 1.1 to 1.2

Heavy continuous grazing which includes herbivory at moderate to heavy levels at the same time of year each year without adequate recovery periods, or during periods of below normal precipitation when grazing frequency and intensity increases on these sites due to limited forage availability on adjacent upland sites will shift this community to the 1.2 Sedge/Rush/Prairie Cordgrass/Reed Canarygrass Plant Community Phase.

Pathway 1.2a
Community 1.2 to 1.1

Prescribed grazing (alternating season of use and providing adequate recovery periods) or periodic light to moderate grazing possibly including periodic rest will convert this plant community to the 1.1 Sedge/Prairie Cordgrass/Reedgrass Plant Community Phase. This pathway could also occur with a return to more normal precipitation levels and frequencies.

State 2
Invaded State

The Invaded State is characterized by the degradation of the biotic integrity of the site due to excessive disturbance resulting in dominance by highly competitive species such as reed canarygrass, and possibly the invasion of non-native species. Loss of diversity and reduction of plant vigor and production have negatively impacted energy flow and nutrient cycling. Infiltration is reduced and native plant mortality is increased. As the disturbance level increases, native plant density decreases even more, giving way to annual species, invasive perennial species, and an increase in bare ground.

Dominant plant species

- reed canarygrass (*Phalaris arundinacea*), shrub
- creeping meadow foxtail (*Alopecurus arundinaceus*), shrub
- foxtail barley (*Hordeum jubatum*), shrub
- barnyardgrass (*Echinochloa crus-galli*), shrub
- quackgrass (*Elymus repens*), shrub
- Kentucky bluegrass (*Poa pratensis*), shrub
- Canada thistle (*Cirsium arvense*), other herbaceous
- spikerush (*Eleocharis*), other herbaceous
- sedge (*Carex*), other herbaceous
- mountain rush (*Juncus arcticus ssp. littoralis*), other herbaceous
- cocklebur (*Xanthium*), other herbaceous

Community 2.1
Reed Canarygrass/Spikerush/Bluegrass

This plant community phase develops either with increased sedimentation, heavy continuous grazing, or with a long-term lack of grazing and/or fire. In each case, native plant vigor is reduced allowing the increase of competitive

species and eventually the introduction of nonnative species. Spikerush and other grass-like species, as well as, bluegrasses will increase. The more competitive forbs will also increase. Reed canarygrass often will increase to the point of dominance while prairie cordgrass will diminish significantly. Other invasive plants such as creeping meadow foxtail or Canada thistle may become prevalent if a seed source is present or nearby. Nutrient cycling will be greatly diminished and the energy flow will shift significantly and be reduced as well. Infiltration will be reduced somewhat compared to the Reference State. This plant community is somewhat resistant to change. The combination of both grazing and fire is most effective in moving this plant community towards the Reference State.

Community 2.2
2.2 Annual/Pioneer Perennial

This plant community develops under severe disturbance, typically abandonment after cropping. The dominant vegetation includes pioneer annual or perennial grasses, forbs, invaders, and early successional biennial and perennial species. Grasses may include inland saltgrass, foxtail barley, barnyardgrass, quackgrass, fowl bluegrass, Kentucky bluegrass, Baltic rush, and sedges. The dominant forbs may include cocklebur, Canada thistle, and other early successional species. The community is susceptible to invasion of 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. Secondary succession is highly variable, depending upon availability and diversity of a viable reproductive source of higher successional species. This plant community may be renovated to improve the production capability but management changes would be needed to maintain the new plant community. The total annual production ranges from 500 to 1,500 lbs./ac. (air-dry weight) depending upon growing conditions. No growth curve has been assigned to this plant community phase due to the highly variable nature of the plant community.

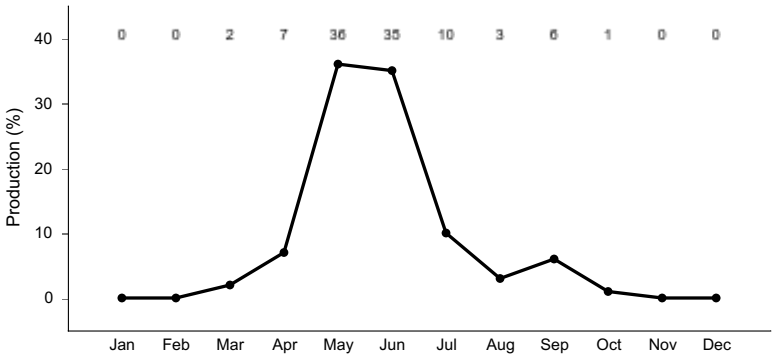


Figure 9. Plant community growth curve (percent production by month). ND5507, Central Black Glaciated Plains, cool-season dominant, warm-season sub-dominant.. Cool-season dominant, warm-season sub-dominant, lowland..

Pathway 2.1a
Community 2.1 to 2.2

Heavy continuous grazing which includes herbivory at moderate to heavy levels at the same time of year each year without adequate recovery periods, or during periods of below normal precipitation when grazing frequency and intensity increases on these sites due to limited forage availability on adjacent upland sites will shift this community to the 2.2 Plant Community Phase.

Pathway 2.2a
Community 2.2 to 2.1

This community pathway occurs with the passage of time as successional processes take place and perennial plants gradually begin to establish on the site again. This pathway will lead to the plant community phase 2.1.

Community 3

Community 4

Transition T1a
State 1 to 2

Sedimentation beyond normal levels due to increased flooding, or non-use and no fire for extended periods of time (typically for 10 or more years) causing litter levels to become high enough to reduce native grass vigor, diversity, and density, or heavy continuous grazing will likely lead this state over a threshold resulting in State 2.

Restoration pathway R2a
State 2 to 1

Long-term prescribed grazing (moderate stocking levels coupled with adequate recovery periods, or other grazing systems such as high-density, low-frequency intended to treat specific species dominance, or periodic light to moderate stocking levels possibly including periodic rest), may lead this plant community phase over a threshold to the Reference State (State 1). Wetland restoration techniques may be necessary to restore biotic integrity and plant diversity and productivity.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Grass-likes**			1800–2400	
	water sedge	CAAQ	*Carex aquatilis*	600–2100	–
	awlfruit sedge	CAST5	*Carex stipata*	60–600	–
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	0–480	–
	woolly sedge	CAPE42	*Carex pellita*	60–480	–
	bottlebrush sedge	CAHY4	*Carex hystericina*	0–300	–
	smoothcone sedge	CALA12	*Carex laeviconica*	0–300	–
	green bulrush	SCAT2	*Scirpus atrovirens*	0–300	–
	flatsedge	CYPER	*Cyperus*	60–180	–
	spikerush	ELEOC	*Eleocharis*	60–180	–
	rush	JUNCU	*Juncus*	60–180	–
2	**Tall Warm-season Grasses**			300–1200	
	prairie cordgrass	SPPE	*Spartina pectinata*	300–1200	–
	spiked muhly	MUGL3	*Muhlenbergia glomerata*	0–300	–
	switchgrass	PAVI2	*Panicum virgatum*	0–180	–
3	**Cool-season Grasses**			600–1200	
	northern reedgrass	CASTI3	*Calamagrostis stricta ssp. inexpansa*	120–900	–
	bluejoint	CACA4	*Calamagrostis canadensis*	60–480	–
	reed canarygrass	PHAR3	*Phalaris arundinacea*	60–300	–
	slimstem reedgrass	CASTS5	*Calamagrostis stricta ssp. stricta*	0–300	–
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	0–300	–
	Canada wildrye	ELCA4	*Elymus canadensis*	60–180	–
	fowl mannagrass	GLST	*Glyceria striata*	60–180	–
	fowl bluegrass	POPA2	*Poa palustris*	60–180	–
Forb					

4	**Forbs**			300–900	
	Forb, native	2FN	*Forb, native*	60–300	–
	milkweed	ASCLE	*Asclepias*	60–180	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	60–180	–
	goldenrod	SOLID	*Solidago*	60–180	–
	broadfruit bur-reed	SPEU	*Sparganium eurycarpum*	60–180	–
	New England aster	SYNO2	*Symphyotrichum novae-angliae*	60–180	–
	broadleaf cattail	TYLA	*Typha latifolia*	0–180	–
	prairie ironweed	VEFA2	*Vernonia fasciculata*	0–120	–
	meadow zizia	ZIAP	*Zizia aptera*	60–120	–
	white panicle aster	SYLA6	*Symphyotrichum lanceolatum*	60–120	–
	marsh skullcap	SCGA	*Scutellaria galericulata*	0–120	–
	marsh fleabane	SECO2	*Senecio congestus*	0–120	–
	hemlock waterparsnip	SISU2	*Sium suave*	60–120	–
	Maximilian sunflower	HEMA2	*Helianthus maximiliani*	60–120	–
	common boneset	EUPE3	*Eupatorium perfoliatum*	60–120	–
	wild mint	MEAR4	*Mentha arvensis*	0–120	–
	water knotweed	POAM8	*Polygonum amphibium*	0–120	–
	curlytop knotweed	POLA4	*Polygonum lapathifolium*	60–120	–
	northern water plantain	ALTR7	*Alisma triviale*	0–120	–
	Canadian anemone	ANCA8	*Anemone canadensis*	60–120	–
	Indianhemp	APCA	*Apocynum cannabinum*	60–120	–
	silverweed cinquefoil	ARAN7	*Argentina anserina*	60–120	–
	nodding beggartick	BICE	*Bidens cernua*	0–60	–
	spotted water hemlock	CIMA2	*Cicuta maculata*	0–60	–
	Illinois bundleflower	DEIL	*Desmanthus illinoensis*	0–60	–
	Macoun's buttercup	RAMA2	*Ranunculus macounii*	0–60	–
	western dock	RUAQ	*Rumex aquaticus*	0–60	–
	Virginia strawberry	FRVI	*Fragaria virginiana*	0–60	–
	rough bugleweed	LYAS	*Lycopus asper*	0–60	–
Shrub/Vine					
5	**Shrubs**			60–300	
	false indigo bush	AMFR	*Amorpha fruticosa*	60–300	–
	willow	SALIX	*Salix*	0–180	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–180	–

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; David Dewald, NRCS State Biologist; Jody Forman, 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.

MLRA 55D was split from MLRA 55B in 2022. Many of the site concepts for this MLRA are borrowed from

neighboring MLRA 55B pending further vegetation and soils validation.

Other references

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

United States Department of Agriculture, Natural Resources Conservation Service. 2022. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture, Agriculture Handbook 296.

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.

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Approval

Suzanne Mayne-Kinney, 11/14/2024

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)	
Contact for lead author	
Date	11/14/2024
Approved by	Suzanne Mayne-Kinney
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

2. **Presence of water flow patterns:**

3. **Number and height of erosional pedestals or terracettes:**

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

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

7. **Amount of litter movement (describe size and distance expected to travel):**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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

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:

    Sub-dominant:

    Other:

Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

14. **Average percent litter cover (%) and depth (in):**

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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:**

17. **Perennial plant reproductive capability:**