USDA Natural Resources
Conservation Service

Ecological site R102AY002SD
Linear Meadow

Accessed: 05/16/2024

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.

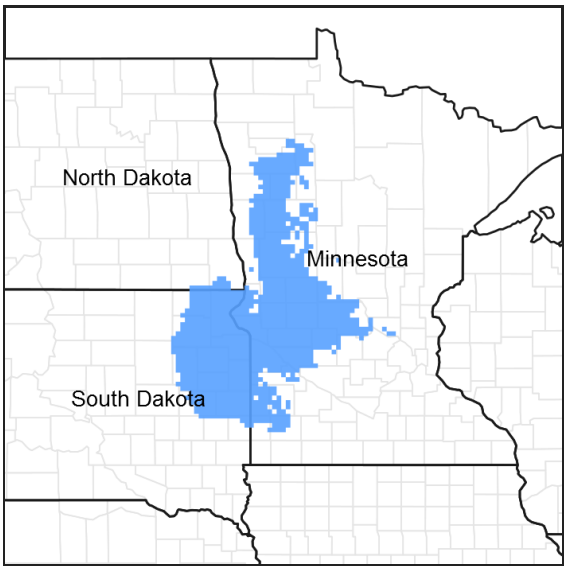


Figure 1. Mapped extent

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: 46e – Tewaukon Dead Ice Moraine, 46k – Prairie Coteau, 46l – Prairie Coteau Escarpment, 46m – Big Sioux Basin, 46o – Minnesota River Prairie, 47b – Des Moines Lobe, 48d – Lake Agassiz Plain, 51j – Alexandria Moraines and Detroit Lakes Outwash Plain.

Associated sites

R102AY001SD	**Shallow Marsh**
R102AY003SD	**Subirrigated**
R102AY004SD	**Wet Meadow**

Similar sites

R102AY001SD	**Shallow Marsh** (R102AY001SD) – Shallow Marsh [less prairie cordgrass whitetop dominant; higher production]

Table 1. Dominant plant species

Tree	Not specified

Shrub	Not specified
Herbaceous	(1) *Spartina pectinata* (2) *Calamagrostis stricta ssp. inexpansa*

Physiographic features

This site occurs on nearly level flood plains or drainageways.

Table 2. Representative physiographic features

Landforms	(1) Flood plain (2) Outwash plain
Flooding duration	Long (7 to 30 days) to very long (more than 30 days)
Flooding frequency	Occasional to frequent
Elevation	305–610 m
Slope	0–1%
Water table depth	0–56 cm
Aspect	Aspect is not a significant factor

Climatic features

MLRA 102A is considered to have a continental climate – cold winters and relatively hot summers, low to moderate humidity, light rainfall, and much sunshine. Extremes in temperature may also abound. The climate is the result of this MLRA's location near the geographic center of North America. There are few natural barriers on the Northern Great Plains and air masses move freely across the plains and account for rapid changes in temperature.

Annual precipitation typically ranges from 21 to 27 inches per year. The average annual temperature is about 43°F. January is the coldest month with average temperatures ranging from about 5°F (Mahnomen 1 W, Minnesota (MN)), to about 14°F (Tracy, MN). July is the warmest month with temperatures averaging from about 69°F (Mahnomen 1 W, MN), to about 73°F (Tracy, MN). The range of normal average monthly temperatures between the coldest and warmest months is about 62°F. This large annual range attests to the continental nature of this area's climate. Hourly winds are estimated to average about 11 miles per hour (mph) annually, ranging from about 13 mph during the spring to about 10 mph 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 mph.

Growth of cool-season plants begins in early to mid-March, slowing or ceasing in late June. Warm-season plants begin growth about mid-May and continue to early or mid-September. Greenup of cool-season plants may occur in September and October when adequate soil moisture is present.

Table 3. Representative climatic features

Frost-free period (average)	152 days
Freeze-free period (average)	174 days
Precipitation total (average)	686 mm

Influencing water features

Soil features

These are very deep, poorly to 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 22 inches below the surface during most of the growing season. This site occurs mainly 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. These soils are not susceptible to water erosion. The high water table 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 (2) Silty clay loam (3) Clay
Family particle size	(1) Clayey
Drainage class	Poorly drained
Permeability class	Very slow to slow
Soil depth	203 cm
Surface fragment cover <=3"	0–2%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	15.24–20.32 cm
Calcium carbonate equivalent (0-101.6cm)	0–20%
Electrical conductivity (0-101.6cm)	0–4 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–3
Soil reaction (1:1 water) (0-101.6cm)	5.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–2%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

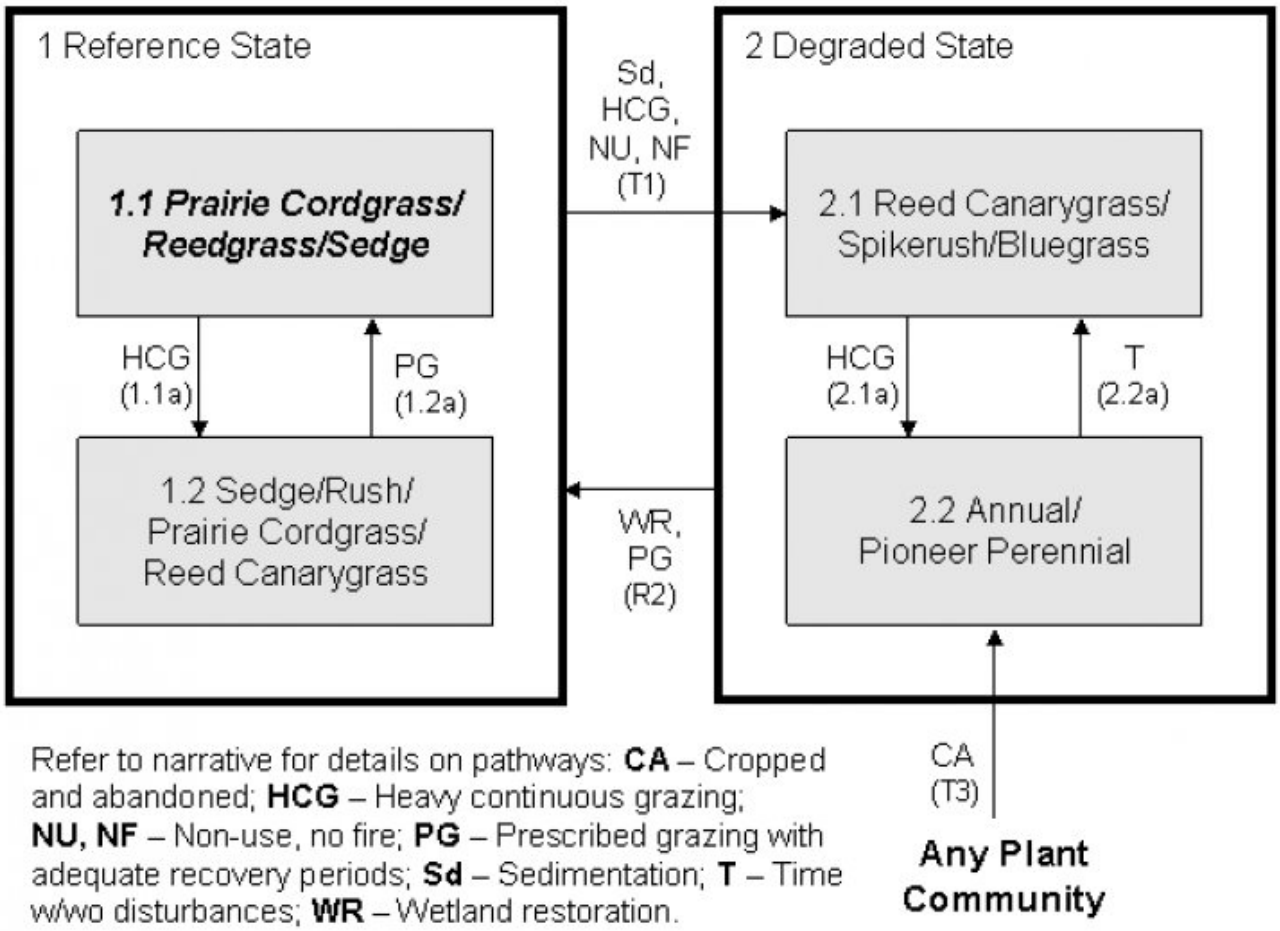
This site developed under Northern Great Plains climatic conditions, light to severe grazing by bison and other large herbivores, sporadic natural or man-caused wildfire (often of light intensities), fluctuating water tables and flooding events, and other biotic and abiotic factors that typically influence 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 Prairie Cordgrass/Reedgrass/Sedge 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



State 1
Reference

This state represents the natural range of variability that dominates the dynamics of this ecological site (ES). This state is typically codominated by cool-season grass and grass-like species, and warm-season grasses. Before European settlement, the primary disturbance mechanisms for this site in the reference condition included sporadic 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. 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.

Community 1.1
Prairie Cordgrass/Reedgrass/Sedge Plant Community Phase

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 65 percent grasses, 20 percent grass-like species, 10 percent forbs, and 5 percent shrubs by air-dry weight. 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 (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	5683	6062	6445
Forb	303	897	1435
Shrub/Vine	67	215	415
Total	**6053**	**7174**	**8295**

Figure 5. Plant community growth curve (percent production by month). SD0208, Rolling Till Prairie, lowland cool-season/warm-season codominant.. Cool-season, warm-season codominant, lowland..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	4	11	19	23	20	12	6	5	0	0

Community 1.2
Sedge/Rush/Prairie Cordgrass/Reed Canarygrass Plant Community Phase

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.

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	5044	5656	6170
Forb	275	650	1076
Shrub/Vine	62	195	375
Total	**5381**	**6501**	**7621**

Figure 7. Plant community growth curve (percent production by month). SD0207, Rolling Till Prairie, cool-season dominant, warm-season subdominant.. Cool-season dominant, warm-season subdominant, lowland..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	13	20	25	18	11	5	3	0	0

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 Prairie Cordgrass/Reedgrass/Sedge Plant Community Phase. This pathway could also occur with a return to more normal precipitation levels and frequencies.

Conservation practices

Prescribed Grazing

State 2
Degraded

This 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 nonnative 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 and invasive perennial species, as well as, an increase in bare ground.

Community 2.1
Reed Canarygrass/Spikerush/Bluegrass Plant Community Phase

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.

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	3811	4434	5027
Forb	224	644	1076
Shrub/Vine	–	77	174
Total	**4035**	**5155**	**6277**

Figure 9. Plant community growth curve (percent production by month). SD0206, Rolling Till Prairie, lowland cool-season dominant.. Cool-season dominant, lowland..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	6	15	20	26	17	9	4	3	0	0

Community 2.2
Annual/Pioneer Perennial Plant Community Phase

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 nonnative 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.

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 Annual/Pioneer Perennial 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 2.1 Reed Canarygrass/Spikerush/Bluegrass Plant Community Phase.

Transition T1
State 1 to 2

Sedimentation beyond normal levels due to increased flooding or nonuse 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 the 2.1 Reed Canarygrass/Spikerush/Blue-grass Plant Community Phase within the Degraded State (State 2).

Restoration pathway R2
State 2 to 1

Wetland restoration coupled with prescribed grazing may lead this plant community phase over a threshold to the Reference State (State 1). Wetland restoration techniques may be effective, but will likely be costly, and the results may not be satisfactory.

Conservation practices

Wetland Restoration
Prescribed Grazing

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Tall Cool-season Grasses**			1435–3228	
	prairie cordgrass	SPPE	*Spartina pectinata*	1435–2869	–
	spiked muhly	MUGL3	*Muhlenbergia glomerata*	0–359	–
	switchgrass	PAVI2	*Panicum virgatum*	0–359	–
2	**Cool-season Grasses**			717–2152	
	northern reedgrass	CASTI3	*Calamagrostis stricta ssp. inexpansa*	143–1435	–
	bluejoint	CACA4	*Calamagrostis canadensis*	143–1076	–
	slimstem reedgrass	CASTS5	*Calamagrostis stricta ssp. stricta*	143–574	–
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	0–359	–
	reed canarygrass	PHAR3	*Phalaris arundinacea*	72–359	–
	fowl bluegrass	POPA2	*Poa palustris*	72–215	–
	Canada wildrye	ELCA4	*Elymus canadensis*	72–215	–
	fowl mannagrass	GLST	*Glyceria striata*	72–215	–
3	**Grass-likes**			359–1793	
	fox sedge	CAVU2	*Carex vulpinoidea*	72–717	–
	woolly sedge	CAPE42	*Carex pellita*	72–717	–
	awlfruit sedge	CAST5	*Carex stipata*	0–574	–
	bottlebrush sedge	CAHY4	*Carex hystericina*	0–574	–
	smoothcone sedge	CALA12	*Carex laeviconica*	0–574	–
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	0–359	–
	green bulrush	SCAT2	*Scirpus atrovirens*	0–359	–
	flatsedge	CYPER	*Cyperus*	0–215	–
	spikerush	ELEOC	*Eleocharis*	72–215	–
	rush	JUNCU	*Juncus*	72–215	–
Forb					
4	**Forbs**			359–1435	
	Forb, native	2FN	*Forb, native*	72–359	–
	milkweed	ASCLE	*Asclepias*	72–215	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	72–215	–
	goldenrod	SOLID	*Solidago*	72–215	–
	broadfruit bur-reed	SPEU	*Sparganium eurycarpum*	72–215	–
	New England aster	SYNO2	*Symphyotrichum novae-angliae*	72–215	–
	broadleaf cattail	TYLA	*Typha latifolia*	0–215	–
	prairie ironweed	VEFA2	*Vernonia fasciculata*	0–143	–
	meadow zizia	ZIAP	*Zizia aptera*	72–143	–
	white panicle aster	SYLA6	*Symphyotrichum lanceolatum*	72–143	–
	marsh skullcap	SCGA	*Scutellaria galericulata*	0–143	–
	marsh fleabane	SECO2	*Senecio congestus*	0–143	

	marsh fleabane	SECO2	*Senecio congestus*	0–143	–
	hemlock waterparsnip	SISU2	*Sium suave*	72–143	–
	Maximilian sunflower	HEMA2	*Helianthus maximiliani*	72–143	–
	common boneset	EUPE3	*Eupatorium perfoliatum*	72–143	–
	wild mint	MEAR4	*Mentha arvensis*	0–143	–
	water knotweed	POAM8	*Polygonum amphibium*	0–143	–
	curlytop knotweed	POLA4	*Polygonum lapathifolium*	72–143	–
	northern water plantain	ALTR7	*Alisma triviale*	0–143	–
	Canadian anemone	ANCA8	*Anemone canadensis*	72–143	–
	Indianhemp	APCA	*Apocynum cannabinum*	72–143	–
	silverweed cinquefoil	ARAN7	*Argentina anserina*	72–143	–
	nodding beggartick	BICE	*Bidens cernua*	0–72	–
	spotted water hemlock	CIMA2	*Cicuta maculata*	0–72	–
	Illinois bundleflower	DEIL	*Desmanthus illinoensis*	0–72	–
	Macoun's buttercup	RAMA2	*Ranunculus macounii*	0–72	–
	western dock	RUAQ	*Rumex aquaticus*	0–72	–
	Virginia strawberry	FRVI	*Fragaria virginiana*	0–72	–
	rough bugleweed	LYAS	*Lycopus asper*	0–72	–
Shrub/Vine					
5	**Shrubs**			72–359	
	false indigo bush	AMFR	*Amorpha fruticosa*	72–359	–
	willow	SALIX	*Salix*	0–215	–
	Forb, native	2FN	*Forb, native*	0–215	–

Table 9. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Tall Warm-season Grasses**			325–1625	
	prairie cordgrass	SPPE	*Spartina pectinata*	325–1625	–
	switchgrass	PAVI2	*Panicum virgatum*	0–130	–
2	**Cool-season Grasses**			325–1625	
	reed canarygrass	PHAR3	*Phalaris arundinacea*	130–780	–
	fowl bluegrass	POPA2	*Poa palustris*	65–520	–
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	0–325	–
	northern reedgrass	CASTI3	*Calamagrostis stricta ssp. inexpansa*	0–325	–
	bluejoint	CACA4	*Calamagrostis canadensis*	0–260	–
	slimstem reedgrass	CASTS5	*Calamagrostis stricta ssp. stricta*	0–195	–
	fowl mannagrass	GLST	*Glyceria striata*	0–130	–
	Canada wildrye	ELCA4	*Elymus canadensis*	0–65	–
3	**Grass-likes**			975–2925	
	woolly sedge	CAPE42	*Carex pellita*	65–975	–
	fox sedge	CAVU2	*Carex vulpinoidea*	65–975	–
	rush	JUNCU	*Juncus*	130–975	–

	rush	JUNCU	*Juncus*	130–975	
	awlfruit sedge	CAST5	*Carex stipata*	65–650	–
	bottlebrush sedge	CAHY4	*Carex hystericina*	65–650	–
	smoothcone sedge	CALA12	*Carex laeviconica*	65–650	–
	spikerush	ELEOC	*Eleocharis*	130–520	–
	flatsedge	CYPER	*Cyperus*	0–455	–
	green bulrush	SCAT2	*Scirpus atrovirens*	0–260	–
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	0–195	–
Forb					
4	**Forbs**			325–975	
	goldenrod	SOLID	*Solidago*	65–390	–
	broadfruit bur-reed	SPEU	*Sparganium eurycarpum*	0–325	–
	New England aster	SYNO2	*Symphyotrichum novae-angliae*	65–325	–
	broadleaf cattail	TYLA	*Typha latifolia*	0–260	–
	Forb, introduced	2FI	*Forb, introduced*	65–260	–
	Forb, native	2FN	*Forb, native*	0–195	–
	Indianhemp	APCA	*Apocynum cannabinum*	65–195	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	65–195	–
	white panicle aster	SYLA6	*Symphyotrichum lanceolatum*	65–195	–
	spotted water hemlock	CIMA2	*Cicuta maculata*	0–130	–
	milkweed	ASCLE	*Asclepias*	0–130	–
	water knotweed	POAM8	*Polygonum amphibium*	0–130	–
	curlytop knotweed	POLA4	*Polygonum lapathifolium*	0–65	–
	Macoun's buttercup	RAMA2	*Ranunculus macounii*	0–65	–
	marsh skullcap	SCGA	*Scutellaria galericulata*	0–65	–
	hemlock waterparsnip	SISU2	*Sium suave*	0–65	–
	prairie ironweed	VEFA2	*Vernonia fasciculata*	0–65	–
	meadow zizia	ZIAP	*Zizia aptera*	0–65	–
	nodding beggartick	BICE	*Bidens cernua*	0–65	–
	Maximilian sunflower	HEMA2	*Helianthus maximiliani*	0–65	–
	wild mint	MEAR4	*Mentha arvensis*	0–65	–
	silverweed cinquefoil	ARAN7	*Argentina anserina*	0–65	–
	Canadian anemone	ANCA8	*Anemone canadensis*	0–65	–
Shrub/Vine					
6	**Shrubs**			65–325	
	false indigo bush	AMFR	*Amorpha fruticosa*	65–325	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–130	–
	meadow willow	SAPE5	*Salix petiolaris*	0–65	–

Table 10. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Tall Warm-season Grasses**			0–258	
	prairie cordgrass	SPPE	*Spartina pectinata*	0–258	–
2	**Cool-season Grasses**			1031–2320	
	reed canarygrass	PHAR3	*Phalaris arundinacea*	773–2062	–
	fowl bluegrass	POPA2	*Poa palustris*	103–516	–
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	0–258	–
3	**Grass-likes**			773–2320	
	spikerush	ELEOC	*Eleocharis*	516–1289	–
	rush	JUNCU	*Juncus*	258–1031	–
	woolly sedge	CAPE42	*Carex pellita*	0–258	–
	awlfruit sedge	CAST5	*Carex stipata*	0–258	–
	fox sedge	CAVU2	*Carex vulpinoidea*	0–258	–
	bottlebrush sedge	CAHY4	*Carex hystericina*	0–258	–
	smoothcone sedge	CALA12	*Carex laeviconica*	0–155	–
	flatsedge	CYPER	*Cyperus*	0–103	–
	green bulrush	SCAT2	*Scirpus atrovirens*	0–52	–
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	0–52	–
Forb					
4	**Forbs**			258–1031	
	Forb, introduced	2FI	*Forb, introduced*	52–619	–
	goldenrod	SOLID	*Solidago*	52–412	–
	New England aster	SYNO2	*Symphyotrichum novae-angliae*	52–309	–
	broadleaf cattail	TYLA	*Typha latifolia*	52–309	–
	white panicle aster	SYLA6	*Symphyotrichum lanceolatum*	52–206	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	0–103	–
	Forb, native	2FN	*Forb, native*	0–103	–
	Indianhemp	APCA	*Apocynum cannabinum*	0–103	–
	milkweed	ASCLE	*Asclepias*	0–52	–
	spotted water hemlock	CIMA2	*Cicuta maculata*	0–52	–
	water knotweed	POAM8	*Polygonum amphibium*	0–52	–
	broadfruit bur-reed	SPEU	*Sparganium eurycarpum*	0–52	–
Shrub/Vine					
5	**Shrubs**			0–155	
	false indigo bush	AMFR	*Amorpha fruticosa*	0–155	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–52	–

Animal community

Animal Community – Grazing Interpretations
The following table lists annual, suggested initial stocking rates with average growing conditions. These are conservative estimates that should be used only as guidelines in the initial stages of conservation planning. Often,

the current plant composition does not entirely match any particular plant community (as described in this ES description). Because of this a resource inventory is necessary to document plant composition and production. More accurate carrying capacity estimates should eventually be calculated using the following stocking rate information along with animal preference data and actual stocking records, particularly when grazers other than cattle are involved. With consultation of the land manager, more intensive grazing management may result in improved harvest efficiencies and increased carrying capacity.

Prairie Cordgrass/Reedgrass/Sedge (1.1)
Average Annual Production (lbs./acre, air-dry): 6400
Stocking Rate* (AUM/acre): 1.75

Sedge/Rush/Prairie Codgrass/Reed Canarygrass (1.2)
Average Annual Production (lbs./acre, air-dry): 5800
Stocking Rate* (AUM/acre): 1.59

Reed Canarygrass/Spikerush/Bluegrass (2.1)
Average Annual Production (lbs./acre, air-dry): 4600
Stocking Rate* (AUM/acre): 1.26

Annual/Pioneer Perennial (2.2)
Average Annual Production (lbs./acre, air-dry): 1600
Stocking Rate* (AUM/acre): 0.44

*Based on 912 lbs./acre (air-dry weight) per Animal Unit Month (AUM), and on 25 percent harvest efficiency (refer to United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), National Range and Pasture Handbook).

Grazing by domestic livestock is one of the major income-producing industries in the area. Rangeland in this area may provide yearlong forage. During the dormant period, the forage for livestock will likely be lacking protein to meet livestock requirements and added protein will allow ruminants to better utilize the energy stored in grazed plant materials. A forage quality test (either directly or through fecal sampling) should be used to determine the level of supplementation needed.

Hydrological functions

Water is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic groups C and D. Infiltration is typically slow to very slow and runoff potential for this site varies from negligible to medium depending on soil hydrologic group, slope, and ground cover. In many cases, areas with greater than 75 percent ground cover have the greatest potential for lower runoff. Areas where ground cover is less than 50 percent have the greatest potential to have reduced infiltration and higher runoff (refer to Section 4, NRCS National Engineering Handbook for runoff quantities and hydrologic curves).

Recreational uses

This site provides hunting, hiking, photography, bird watching, and other opportunities. The wide varieties of plants that bloom from spring until fall have an esthetic value that appeals to visitors.

Wood products

No appreciable wood products are typically present on this 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 clipping data and other inventory data. Field observations from range-trained personnel were also used. Those involved in developing this site include: Stan Boltz, Range Management Specialist, NRCS; and Bruce Kunze, Soil Scientist, NRCS.

Other references

High Plains Regional Climate Center, University of Nebraska, 830728 Chase Hall, Lincoln, NE 68583-0728. (http://www.hprcc.unl.edu/)
USDA, NRCS. National Water and Climate Center, 101 SW Main, Suite 1600, Portland, OR 97204-3224. (http://www.wcc.nrcs.usda.gov)
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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)	David Schmidt, Tim Nordquist, Stan Boltz
Contact for lead author	
Date	12/04/2007
Approved by	Stan Boltz
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills should not be present.

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

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3. **Number and height of erosional pedestals or terracettes:** Essentially, non-existent.

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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 less than 5% and less than 2 inches in diameter.

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5. **Number of gullies and erosion associated with gullies:** Active gullies should not be present.

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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):** Little to no plant litter movement. Plant litter remains in place and is not moved by erosional forces.

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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):** Stability class 6. Typically high root content, and organic matter. Soil surface is very resistant to erosion.

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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 and color of A-horizon.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Healthy, deep rooted native grasses enhance infiltration and reduce runoff.

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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):** No compaction layer should be evident.

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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: Tall warm-season rhizomatous grass >> mid & tall cool-season grass-likes

    Sub-dominant: > tall cool-season rhizomatous grass > tall cool-season bunch grass = short cool-season grass = forb = shrub

    Other:

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Very little to no evidence of decadence or mortality.

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14. **Average percent litter cover (%) and depth (in):** 85-90%, roughly 1-3 inches. Litter cover is 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):** 5800 – 7000 lbs./acre air-dry weight, average 6,400 lbs./acre air-dry weight

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:** Refer to State and Local Noxious Weed List, also reed canarygrass.

17. **Perennial plant reproductive capability:** All species are capable of reproducing.