USDA Natural Resources Conservation Service

Ecological site R102AY016SD
Very Shallow

Accessed: 05/15/2024

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.

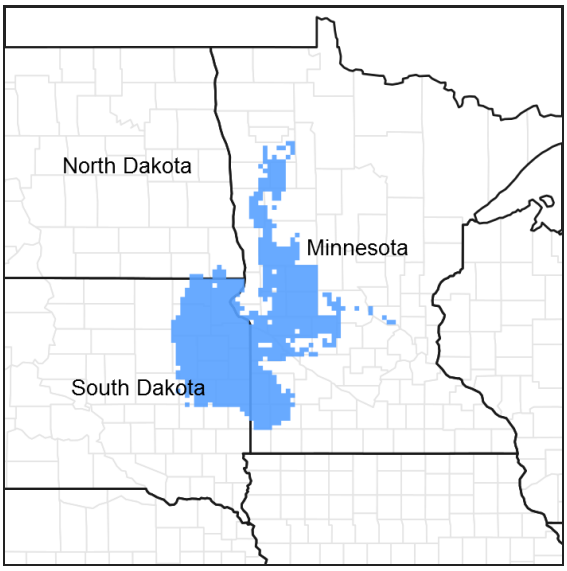


Figure 1. Mapped extent

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

R102AY010SD	**Loamy**
R102AY014SD	**Shallow Gravel**

Similar sites

R102AY014SD	**Shallow Gravel** (R102AY014SD) – Shallow Gravel [more bluestem; higher production]

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified

Herbaceous	(1) *Hesperostipa comata ssp. comata* (2) *Hesperostipa spartea*

Physiographic features

This site occurs on gently to steeply sloping uplands.

Table 2. Representative physiographic features

Landforms	(1) Outwash plain (2) Outwash terrace (3) Moraine
Elevation	305–610 m
Slope	2–30%
Water table depth	122–203 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

No riparian areas or wetland features are directly associated with this site.

Soil features

The common features of soils in this site are the gravelly loam to extremely gravelly sand textured subsoil and slopes of 2 to 30 percent. The soils in this site are excessively well-drained and formed in till outwash materials. The gravelly sandy loam or gravelly loam surface layer is four to eight inches thick. The soils have a moderate to rapid infiltration rate. This site should show no evidence of rills, wind scoured areas, or pedestalled plants. If present, water flow paths are broken, irregular in appearance, or discontinuous. The soil surface is very unstable but intact. Subsurface soil layers are restrictive to root penetration.

These soils are mainly susceptible to water erosion. The hazard of water erosion increases on slopes greater than about 15 percent. Low available water capacity caused by the shallow rooting depth strongly influences the soil-water-plant relationship. With the high amounts of gravel throughout the profile, erosion is typically not a concern.

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) Gravelly loam (2) Sandy loam
Family particle size	(1) Sandy
Drainage class	Somewhat excessively drained
Permeability class	Moderate to rapid
Soil depth	13–25 cm
Surface fragment cover <=3"	6–26%
Surface fragment cover >3"	0–9%
Available water capacity (0-101.6cm)	5.08–7.62 cm
Calcium carbonate equivalent (0-101.6cm)	0–15%
Electrical conductivity (0-101.6cm)	0–2 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)	26–54%
Subsurface fragment volume >3" (Depth not specified)	2–19%

Ecological dynamics

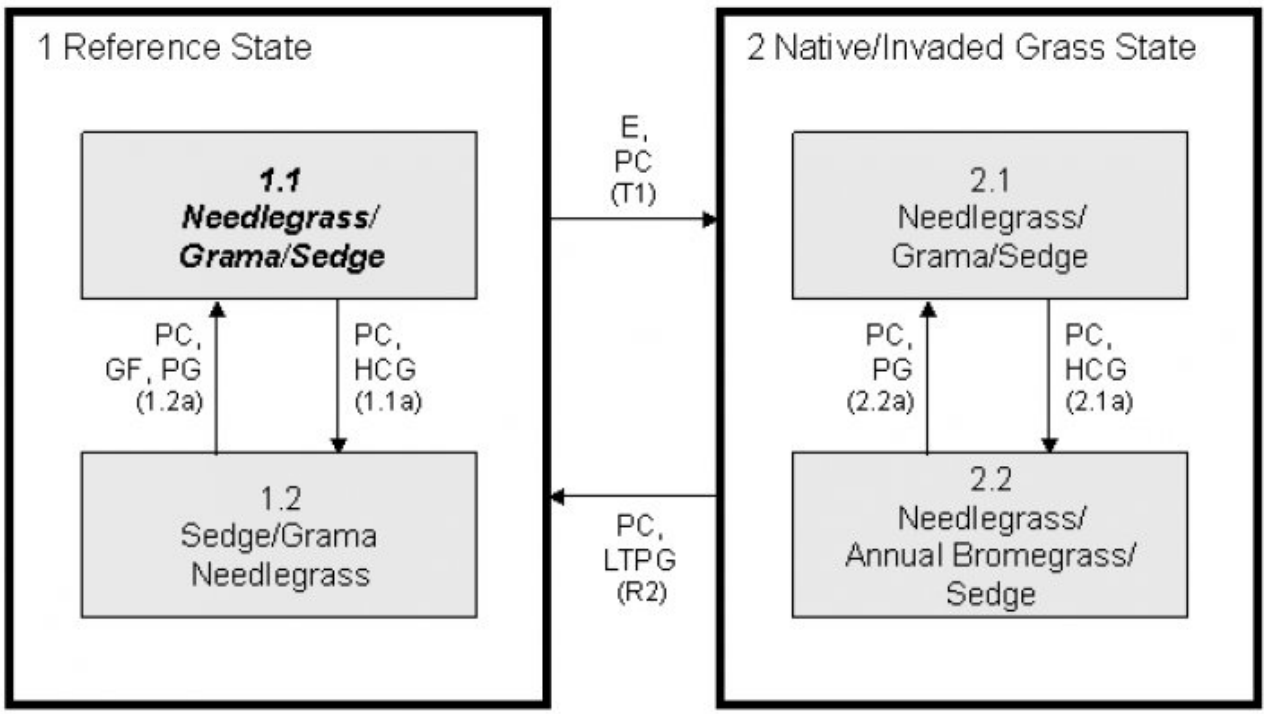
This site developed under Northern Great Plains climatic conditions, light to severe grazing by bison and other large herbivores, sporadic natural or man-caused wildfire (often of light intensities), and other biotic and abiotic factors that typically influence soil/site development. Changes will occur 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.

This ecological site is naturally resilient, and quite resistant to change. Also, due to the relatively steep slopes and naturally low fertility of the soils, this site generally avoids more intensive disturbances such as farming. However, continuous season-long grazing (during the typical growing season of May through October) and/or repeated seasonal grazing (e.g., every spring, every summer) without adequate recovery periods following each grazing occurrence can cause this site to depart from the Needlegrass/Grama/Western Wheatgrass Plant Community Phase. Sedges and gramas can increase and eventually develop into a sod while many of the tall and mid-statured grasses will decrease (e.g., little bluestem, green needlegrass, needleandthread, porcupine grass, and western wheatgrass). Even with these disturbances, many of the tall- and mid-statured grasses will remain in the community at reduced levels, allowing recovery to occur once the disturbances are removed.

Interpretations are primarily based on the Needlegrass/Grama/Western Wheatgrass Plant Community Phase (1.1). 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.

State and transition model



Refer to narrative for details on pathways: **E** – Encroachment of non-native species; **GF** – Grazing and fire returned to normal disturbance regime levels and frequencies; **HCG** – Heavy continuous grazing (repeated grazing during the growing season without adequate recovery periods; **LTPG** – Long-term presribed grazing; **PC** – Precipitation cycles; **PG** – Prescribed grazing.

State 1
Reference

This state represents the natural range of variability that dominates the dynamics of this ecological site (ES). This state is dominated by cool-season grasses with warm-season grasses being subdominant. In pre-European times, the primary disturbance mechanisms for this site in the reference condition included grazing by large herding ungulates and fluctuations in levels of precipitation. Grazing coupled with weather events dictated the dynamics that occurred within the natural range of variability. Today, this state 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 dominant tall and mid-grass species can decline and a corresponding increase in short-statured species will occur.

Community 1.1
Needlegrass/Grama/Sedge Plant Community Phase

The Needlegrass/Grama/Sedge Plant Community Phase is the plant community upon which interpretations are primarily based. This is also considered to be climax. This plant community can be found on areas that are properly managed with prescribed grazing that allows for proper utilization, changes in season of use and adequate recovery

periods following each grazing event. The potential vegetation is about 75 percent grasses or grass-like plants, 15 percent forbs, and 10 percent shrubs. Cool-season grass and grass-like species dominate this plant community, with warm-season grasses being subdominant. The major grass or grass-like species include needlegrasses (needleandthread, green needlegrass, and/or porcupine grass), blue and/or hairy grama, sideoats grama, threadleaf sedge, and needleleaf sedge. Other grasses occurring on the site include threeawn, plains muhly, little bluestem, and prairie Junegrass. The significant forbs include dotted gayfeather, hairy goldaster, purple coneflower, and prairie clover. Significant shrubs are fringed sagewort, leadplant, rose, skunkbush sumac, and snowberry. This plant community is moderately resistant to change. The herbaceous species present are well adapted to grazing; however, species composition can be altered through long-term overgrazing. If the herbaceous component is intact, it tends to be resilient if the disturbance is not long-term. This plant community is stable and protected from excessive erosion.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1255	1756	2191
Forb	101	213	370
Shrub/Vine	101	160	241
Total	**1457**	**2129**	**2802**

Figure 5. Plant community growth curve (percent production by month). SD0202, Rolling Till Prairie, cool-season dominant, warm-season subdominant.. Cool-season dominant, warm-season subdominant..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	10	23	34	15	6	5	4	0	0

Community 1.2
Sedge/Grama/Needlegrass Plant Community Phase

This plant community can develop from the adverse effects of heavy, continuous grazing in conjunction with extended periods of below average precipitation. Short grass and grass-like species increase to dominate the site and annual production decreases. Lack of litter and short plant heights result in higher soil temperatures, poor water infiltration rates, and higher evaporation, which gives blue grama and sedges a competitive advantage over cool- and warm-season mid-grasses. Blue grama and threadleaf sedge are the dominant grass/grass-like species. Other grasses may include sideoats grama, needleandthread, prairie Junegrass, and threeawn. Significant forbs include green sagewort, cutleaf ironplant, scurfpeas, white prairie aster, and woolly Indianwheat. Common shrubs include fringed sagewort, cactus, and snowberry. Nonnative species such as Kentucky bluegrass, cheatgrass, and Japanese bromegrass may begin to invade this phase. This plant community is relatively stable. The competitive advantage of blue grama and threadleaf sedge prevents other species from establishing. This plant community is less productive than the 1.1 Needlegrass/Grama/Sedge Plant Community Phase. Runoff has increased and infiltration has decreased. Soil erosion does not increase substantially.

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	762	1202	1608
Forb	45	101	168
Shrub/Vine	45	76	106
Total	**852**	**1379**	**1882**

Figure 7. Plant community growth curve (percent production by month). SD0202, Rolling Till Prairie, cool-season dominant, warm-season subdominant.. Cool-season dominant, warm-season subdominant..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	10	23	34	15	6	5	4	0	0

Pathway 1.1a
Community 1.1 to 1.2

Heavy continuous grazing (grazing the same area for extended portions of the growing season well above recommended stocking rates and without adequate recovery periods), especially when coupled with extended periods of below average precipitation will convert the plant community to the 1.2 Sedge/Grama/Needlegrass Plant Community Phase.

Pathway 1.2a
Community 1.2 to 1.1

Grazing and fire returned to normal disturbance regime levels and frequencies or prescribed grazing (alternating season of use and providing adequate recovery periods) will convert this plant community to the 1.1 Needlegrass/Grama/Sedge Plant Community Phase.

State 2
Native/Invaded Grass

This state represents the more common range of variability that exists with higher levels of grazing management but in the absence of periodic fire due to fire suppression. This state is dominated by cool-season grasses. It 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. Taller cool-season species can decline and a corresponding increase in short-statured grass will occur. Nonnative species such as cheatgrass or Japanese bromegrass can become dominant at times and influence the biotic and hydrologic ecological processes of the State.

Community 2.1
Needlegrass/Grama/Sedge Plant Community Phrase

This plant community is the result of encroachment of nonnative species, often as a result of fluctuations in precipitation cycles, typically extended periods of below average precipitation followed by a mild winter and/or a cool, wet spring. The potential vegetation is about 75 percent grasses or grass-like plants, 15 percent forbs, and 10 percent shrubs. Cool-season grass and grass-like species dominate this plant community, with warm-season grasses being subdominant. The major grass or grass-like species include needlegrasses (needleandthread, green needlegrass, and/or porcupine grass), blue and/or hairy grama, sideoats grama, threadleaf sedge, and needleleaf sedge. Other grasses occurring on the site include threeawn, plains muhly, little bluestem, prairie Junegrass, and nonnative species such as Kentucky bluegrass, cheatgrass, and/or Japanese bromegrass. The significant forbs include dotted gayfeather, purple coneflower, prairie clover, and hairy goldaster. Significant shrubs are fringed sagewort, leadplant, rose, and snowberry. This plant community is very similar to the 1.1 Needlegrass/Grama/Sedge Plant Community Phase (see plant composition tables for specific species composition). The main difference is that this plant community will have a minor amount on nonnative grasses, up to about 10 to 15 percent by weight. This plant community is moderately resistant to change. The herbaceous species present are well adapted to grazing; however, species composition can be altered through long-term overgrazing. If the herbaceous component is intact, it tends to be resilient if the disturbance is not long-term. This plant community is stable and protected from excessive erosion.

Figure 8. Plant community growth curve (percent production by month). SD0202, Rolling Till Prairie, cool-season dominant, warm-season subdominant.. Cool-season dominant, warm-season subdominant..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	10	23	34	15	6	5	4	0	0

Community 2.2

Needlegrass/Annual Bromegrass/Sedge Plant Community Phase

This plant community can develop from the adverse effects of heavy, continuous grazing in conjunction with extended periods of below average precipitation. This plant community phase is further impacted by the invasion of nonnative species such as cheatgrass, Japanese bromegrass, and/or Kentucky bluegrass. Needlegrasses will be evident on the aspect of this phase but will be reduced in vigor and production. Annual bromegrass and sedge will make up a bulk of the composition on this plant community phase. The dominant grass and grass-like species will include threadleaf sedge and/or needleleaf sedge, needlegrass (needleandthread, green needlegrass, and/or porcupine grass), and cheatgrass and/or Japanese bromegrass. Other grasses present include blue grama, threeawn, Kentucky bluegrass, hairy grama, and prairie Junegrass. Significant forbs include green sagewort, cutleaf ironplant, scurfpeas, white prairie aster, and woolly Indianwheat. Common shrubs include cactus, snowberry, and fringed sagewort. Lack of litter and short plant heights result in higher soil temperatures, poor water infiltration rates, and higher evaporation, which gives sedges and annual bromegrass a competitive advantage over cool-and warm-season mid-grasses. This plant community is relatively stable. The competitive advantage of blue grama and threadleaf sedge prevents other species from establishing. This plant community is less productive than the 1.1 Needlegrass/Grama/Sedge Plant Community Phase. Runoff has increased and infiltration has decreased. Soil erosion does not increase substantially.

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	471	832	1182
Forb	45	101	168
Shrub/Vine	45	76	106
Total	**561**	**1009**	**1456**

Figure 10. Plant community growth curve (percent production by month). SD0201, Rolling Till Prairie, cool-season dominant.. Cool-season dominant..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	4	12	25	36	10	5	4	4	0	0

Pathway 2.1a
Community 2.1 to 2.2

Heavy continuous grazing (grazing the same area for extended portions of the growing season well above recommended stocking rates and without adequate recovery periods), especially when coupled with extended periods of below average precipitation will convert the plant community to the 2.2 Needlegrass/Annual Bromegrass/Sedge Plant Community Phase.

Pathway 2.2a
Community 2.2 to 2.1

Prescribed grazing (alternating season of use and providing adequate recovery periods) especially when coupled with a return to more normal precipitation cycles will convert this plant community to the 2.1 Needlegrass/Grama/Sedge Plant Community Phase.

Conservation practices

Prescribed Grazing

Transition T1
State 1 to 2

Encroachment of non-native species and fluctuations in precipitation cycles (typically extended periods of below average precipitation) will cause a shift across a threshold from the Reference State (State 1) to the Native/Invaded

Grass State (State 2).

Restoration pathway R2
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) coupled with a return to more normal precipitation cycles may lead this plant community phase over a threshold to the Reference State (State 1). This will likely take a long period of time, possibly up to 10 years or more, and recovery may not be attainable.

Conservation practices

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	**Needlegrass**			426–958	
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	213–639	–
	porcupinegrass	HESP11	*Hesperostipa spartea*	106–426	–
	green needlegrass	NAVI4	*Nassella viridula*	0–170	–
2	**Short Warm-season Grasses**			213–532	
	blue grama	BOGR2	*Bouteloua gracilis*	106–426	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	43–213	–
	threeawn	ARIST	*Aristida*	21–64	–
3	**Mid Warm-season Grasses**			106–319	
	sideoats grama	BOCU	*Bouteloua curtipendula*	43–213	–
	plains muhly	MUCU3	*Muhlenbergia cuspidata*	43–213	–
	little bluestem	SCSC	*Schizachyrium scoparium*	0–106	–
4	**Other Native Grasses**			21–106	
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	0–85	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	21–64	–
	Scribner's rosette grass	DIOLS	*Dichanthelium oligosanthes var. scribnerianum*	0–43	–
	fall rosette grass	DIWI5	*Dichanthelium wilcoxianum*	0–43	–
5	**Grass-likes**			106–319	
	threadleaf sedge	CAFI	*Carex filifolia*	43–213	–
	sun sedge	CAINH2	*Carex inops ssp. heliophila*	0–106	–
	needleleaf sedge	CADU6	*Carex duriuscula*	21–106	–
Forb					
6	**Forbs**			106–319	
	Forb, native	2FN	*Forb, native*	21–64	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	21–64	–
	blacksamson echinacea	ECAN2	*Echinacea angustifolia*	21–64	–

	hairy false goldenaster	HEVI4	*Heterotheca villosa*	21–64	–
	dotted blazing star	LIPU	*Liatris punctata*	21–43	–
	silverleaf Indian breadroot	PEAR6	*Pediomelum argophyllum*	21–43	–
	false boneset	BREU	*Brickellia eupatorioides*	0–43	–
	field sagewort	ARCA12	*Artemisia campestris*	21–43	–
	purple prairie clover	DAPU5	*Dalea purpurea*	21–43	–
	white heath aster	SYER	*Symphyotrichum ericoides*	21–43	–
	prairie spiderwort	TROC	*Tradescantia occidentalis*	21–43	–
	American vetch	VIAM	*Vicia americana*	21–43	–
	white prairie clover	DACA7	*Dalea candida*	0–21	–
	milkvetch	ASTRA	*Astragalus*	0–21	–
	pussytoes	ANTEN	*Antennaria*	0–21	–
	woolly plantain	PLPA2	*Plantago patagonica*	0–21	–
	slimflower scurfpea	PSTE5	*Psoralidium tenuiflorum*	0–21	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	0–21	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	0–21	–
	lacy tansyaster	MAPI	*Machaeranthera pinnatifida*	0–21	–
	scarlet beeblossom	GACO5	*Gaura coccinea*	0–21	–
Shrub/Vine					
7	**Shrubs**			106–213	
	leadplant	AMCA6	*Amorpha canescens*	21–64	–
	prairie sagewort	ARFR4	*Artemisia frigida*	21–64	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–43	–
	rose	ROSA5	*Rosa*	21–43	–
	snowberry	SYMPH	*Symphoricarpos*	21–43	–
	pricklypear	OPUNT	*Opuntia*	0–21	–
	skunkbush sumac	RHTR	*Rhus trilobata*	0–21	–

Table 9. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Needlegrass**			73–219	
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	0–219	–
	porcupinegrass	HESP11	*Hesperostipa spartea*	0–219	–
	green needlegrass	NAVI4	*Nassella viridula*	0–219	–
2	**Short Warm-season Grasses**			219–437	
	blue grama	BOGR2	*Bouteloua gracilis*	146–364	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	44–219	–
	threeawn	ARIST	*Aristida*	29–117	–
3	**Mid Warm-season Grasses**			15–146	
	plains muhly	MUCU3	*Muhlenbergia cuspidata*	15–146	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	0–73	–
	little bluestem	SCSC	*Schizachyrium scoparium*	0–29	–
4	**Other Native Grasses**			15–58	

4	**Other Native Grasses**			15–58	
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	0–44	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	15–29	–
	Scribner's rosette grass	DIOLS	*Dichanthelium oligosanthes var. scribnerianum*	0–15	–
	fall rosette grass	DIWI5	*Dichanthelium wilcoxianum*	0–15	–
5	**Grass-likes**			219–437	
	threadleaf sedge	CAFI	*Carex filifolia*	146–291	–
	needleleaf sedge	CADU6	*Carex duriuscula*	73–219	–
	sun sedge	CAINH2	*Carex inops ssp. heliophila*	0–146	–
6	**Non-Native Grasses**			0–146	
	field brome	BRAR5	*Bromus arvensis*	0–146	–
	cheatgrass	BRTE	*Bromus tectorum*	0–146	–
	bluegrass	POA	*Poa*	0–146	–
	smooth brome	BRIN2	*Bromus inermis*	0–73	–
Forb					
7	**Forbs**			73–219	
	white sagebrush	ARLU	*Artemisia ludoviciana*	15–73	–
	Forb, introduced	2FI	*Forb, introduced*	0–58	–
	blacksamson echinacea	ECAN2	*Echinacea angustifolia*	15–58	–
	field sagewort	ARCA12	*Artemisia campestris*	15–58	–
	Forb, native	2FN	*Forb, native*	15–44	–
	white heath aster	SYER	*Symphyotrichum ericoides*	15–44	–
	hairy false goldenaster	HEVI4	*Heterotheca villosa*	0–29	–
	silverleaf Indian breadroot	PEAR6	*Pediomelum argophyllum*	15–29	–
	woolly plantain	PLPA2	*Plantago patagonica*	0–15	–
	slimflower scurfpea	PSTE5	*Psoralidium tenuiflorum*	0–15	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	0–15	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	0–15	–
	dotted blazing star	LIPU	*Liatris punctata*	0–15	–
	lacy tansyaster	MAPI	*Machaeranthera pinnatifida*	0–15	–
	pussytoes	ANTEN	*Antennaria*	0–15	–
	purple prairie clover	DAPU5	*Dalea purpurea*	0–15	–
	prairie spiderwort	TROC	*Tradescantia occidentalis*	0–15	–
	American vetch	VIAM	*Vicia americana*	0–15	–
Shrub/Vine					
8	**Shrubs**			73–146	
	prairie sagewort	ARFR4	*Artemisia frigida*	15–73	–
	pricklypear	OPUNT	*Opuntia*	0–29	–
	snowberry	SYMPH	*Symphoricarpos*	0–29	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–29	–
	leadplant	AMCA6	*Amorpha canescens*	0–15	–
	rose	ROSA5	*Rosa*	0–15	–

Table 10. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Needlegrass**			50–202	
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	0–202	–
	porcupinegrass	HESP11	*Hesperostipa spartea*	0–202	–
	green needlegrass	NAVI4	*Nassella viridula*	0–202	–
2	**Short Warm-season Grasses**			50–151	
	threeawn	ARIST	*Aristida*	20–121	–
	blue grama	BOGR2	*Bouteloua gracilis*	20–101	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	0–71	–
3	**Mid Warm-season Grasses**			0–30	
	plains muhly	MUCU3	*Muhlenbergia cuspidata*	0–30	–
4	**Other Native Grasses**			0–30	
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	0–30	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–20	–
5	**Grass-likes**			151–303	
	threadleaf sedge	CAFI	*Carex filifolia*	101–202	–
	needleleaf sedge	CADU6	*Carex duriuscula*	50–151	–
	sun sedge	CAINH2	*Carex inops ssp. heliophila*	0–101	–
6	**Non-Native Grasses**			101–303	
	field brome	BRAR5	*Bromus arvensis*	50–202	–
	cheatgrass	BRTE	*Bromus tectorum*	50–202	–
	bluegrass	POA	*Poa*	0–101	–
	smooth brome	BRIN2	*Bromus inermis*	0–50	–
Forb					
7	**Forbs**			50–151	
	Forb, introduced	2FI	*Forb, introduced*	10–81	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	10–71	–
	field sagewort	ARCA12	*Artemisia campestris*	10–61	–
	white heath aster	SYER	*Symphyotrichum ericoides*	10–40	–
	Forb, native	2FN	*Forb, native*	0–20	–
	blacksamson echinacea	ECAN2	*Echinacea angustifolia*	10–20	–
	silverleaf Indian breadroot	PEAR6	*Pediomelum argophyllum*	0–10	–
	woolly plantain	PLPA2	*Plantago patagonica*	0–10	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	0–10	–
	pussytoes	ANTEN	*Antennaria*	0–10	–
Shrub/Vine					
8	**Shrubs**			50–101	
	prairie sagewort	ARFR4	*Artemisia frigida*	2–9	–
	pricklypear	OPUNT	*Opuntia*	0–4	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–3	–

	snowberry	SYMPH	*Symphoricarpos*	0–1	–

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.

Needlegrass/Grama/Sedge (1.1 & 2.1)
Average Annual Production (lbs./acre, air-dry): 1900
Stocking Rate* (AUM/acre):0.52

Sedge/Grama/Needlegrass (1.2)
Average Annual Production (lbs./acre, air-dry): 1300
Stocking Rate* (AUM/acre):0.36

Needlegrass/Annual Bromegrass/Sedge (2.2)
Average Annual Production (lbs./acre, air-dry): 900
Stocking Rate* (AUM/acre):0.25

*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 group A. Infiltration is typically moderate to rapid and runoff potential for this site varies from negligible to low 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 high infiltration and lower runoff. An example of an exception would be where shortgrasses form a strong sod and dominate the site. Dominance by blue grama and/or sedge will result in reduced infiltration and increased 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:** Typically not observable.

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

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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 20-40%.

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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.

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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 usually 4-6. Moderately high root content. Soil surface is resistant to erosion, in large part due to high rock/gravel content.

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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, 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: Mid cool-season bunch grass > short warm-season grass

    Sub-dominant: > short cool-season grass > mid warm-season rhizomatous grass > mid warm-season bunch 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):** 20-40%, less than 0.5 inch thick. Litter cover is in contact with soil surface.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 1600 – 2200 lbs./acre air-dry weight, average 1,900 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

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