USDA Natural Resources
Conservation Service

Ecological site R058DY021SD
Clayey Overflow

Last updated: 7/18/2024
Accessed: 05/21/2025

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.

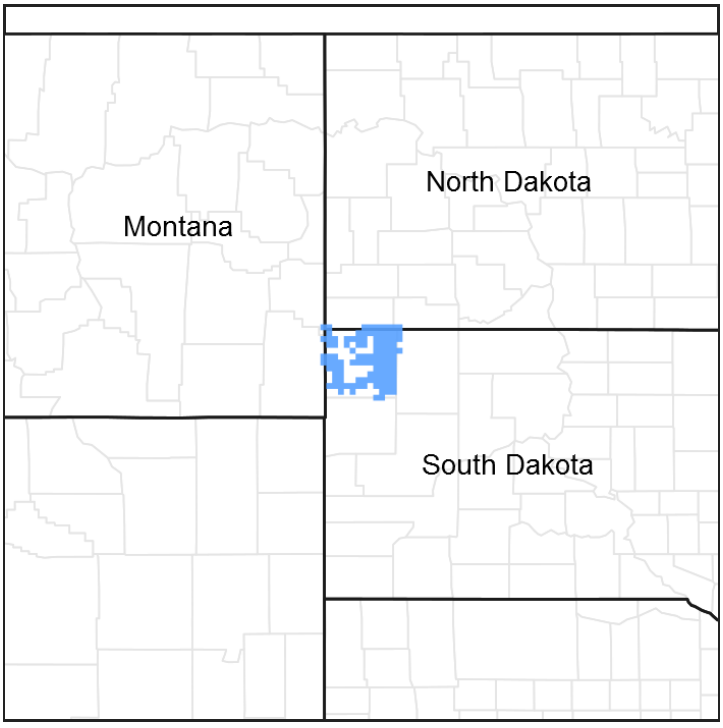


Figure 1. Mapped extent

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: 43e – Sagebrush Steppe.

Associated sites

R058DY010SD	**Loamy**
R058DY011SD	**Clayey**
R058DY022SD	**Loamy Terrace**

Similar sites

R058DY020SD	**Loamy Overflow** Loamy Overflow [more big bluestem; less western wheatgrass]
R058DY007SD	**Saline Lowland** Saline Lowland [more cordgrass and saltgrass; more production]

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Pascopyrum smithii* (2) *Nassella viridula*

Physiographic features

This site is nearly level to gently sloping and occurs on uplands and river valleys.

Table 2. Representative physiographic features

Landforms	(1) Alluvial fan (2) Flood plain (3) Stream terrace
Runoff class	Low
Flooding frequency	None
Ponding frequency	None
Elevation	2,300–4,000 ft
Slope	0–3%
Water table depth	80 in
Aspect	Aspect is not a significant factor

Climatic features

The climate in this MLRA is typical of the drier portions of the Northern Great Plains where sagebrush steppes to the west yield to grassland to the east. Annual precipitation ranges

from 14 to 16 inches. Most of the rainfall occurs as frontal storms early in the growing season. Some high-intensity, convective thunderstorms occur the summer. Precipitation in winter occurs as snow. Temperatures show a wide range between summer and winter and between daily maximums and minimums, due to the high elevation and dry air, which permits rapid incoming and outgoing radiation. Outbreaks of cold air from Canada in winter move rapidly from northwest to southeast and account for extreme minimum temperatures. Extreme storms may occur during the winter, but most severely affect ranch operations during late winter and spring. The normal average annual temperature is about 44° F. January is the coldest month with average temperatures ranging from about 12° F (Marmarth, ND) to about 20° F (Baker, MT). July is the warmest month with temperatures averaging from about 70° F (Marmarth, ND) to about 76° F (Baker, MT). The range of normal average monthly temperatures between the coldest and warmest months is about 55° F. Hourly winds are estimated to average about 11 miles per hour annually, ranging from about 13 miles per hour during the spring to about 10 miles per hour during the summer. Daytime winds are generally stronger than nighttime and occasional strong storms may bring brief periods of high winds with gusts to more than 50 miles per hour.

Growth of cool season plants begins in early to mid March, slowing or ceasing in late June. Warm season plants begin growth about mid May and can continue to early or mid September. Green up 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)	123 days
Freeze-free period (average)	140 days
Precipitation total (average)	16 in

Influencing water features

Stream Type: B6, C6 (Rosgen System)

Soil features

The soils in this site are moderately well to well-drained and formed in alluvium. The silty clay loam to clay surface layer is 3 to 11 inches thick. The soils have a very slow to moderately slow infiltration rate. This site should show no evidence of rills, wind scoured areas, or pedestalled plants. Water flow paths are broken, irregular in appearance, or discontinuous with numerous debris dams or vegetative barriers. The soil surface is stable and intact.

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

Table 4. Representative soil features

Parent material	(1) Alluvium
Surface texture	(1) Silty clay loam (2) Clay (3) Silty clay
Family particle size	(1) Clayey
Drainage class	Moderately well drained to well drained
Permeability class	Very slow to moderately slow
Soil depth	80 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	6–8 in
Calcium carbonate equivalent (0-40in)	0–15%
Electrical conductivity (0-40in)	0–8 mmhos/cm
Sodium adsorption ratio (0-40in)	0–5
Soil reaction (1:1 water) (0-40in)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–10%
Subsurface fragment volume >3" (Depth not specified)	0–5%

Ecological dynamics

This site developed under Northern Great Plains climatic conditions, natural influences of large herbivores, occasional fire, 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 between communities that will occur, severe disturbances, such as periods of well below average precipitation, can cause significant shifts in plant communities and/or species composition.

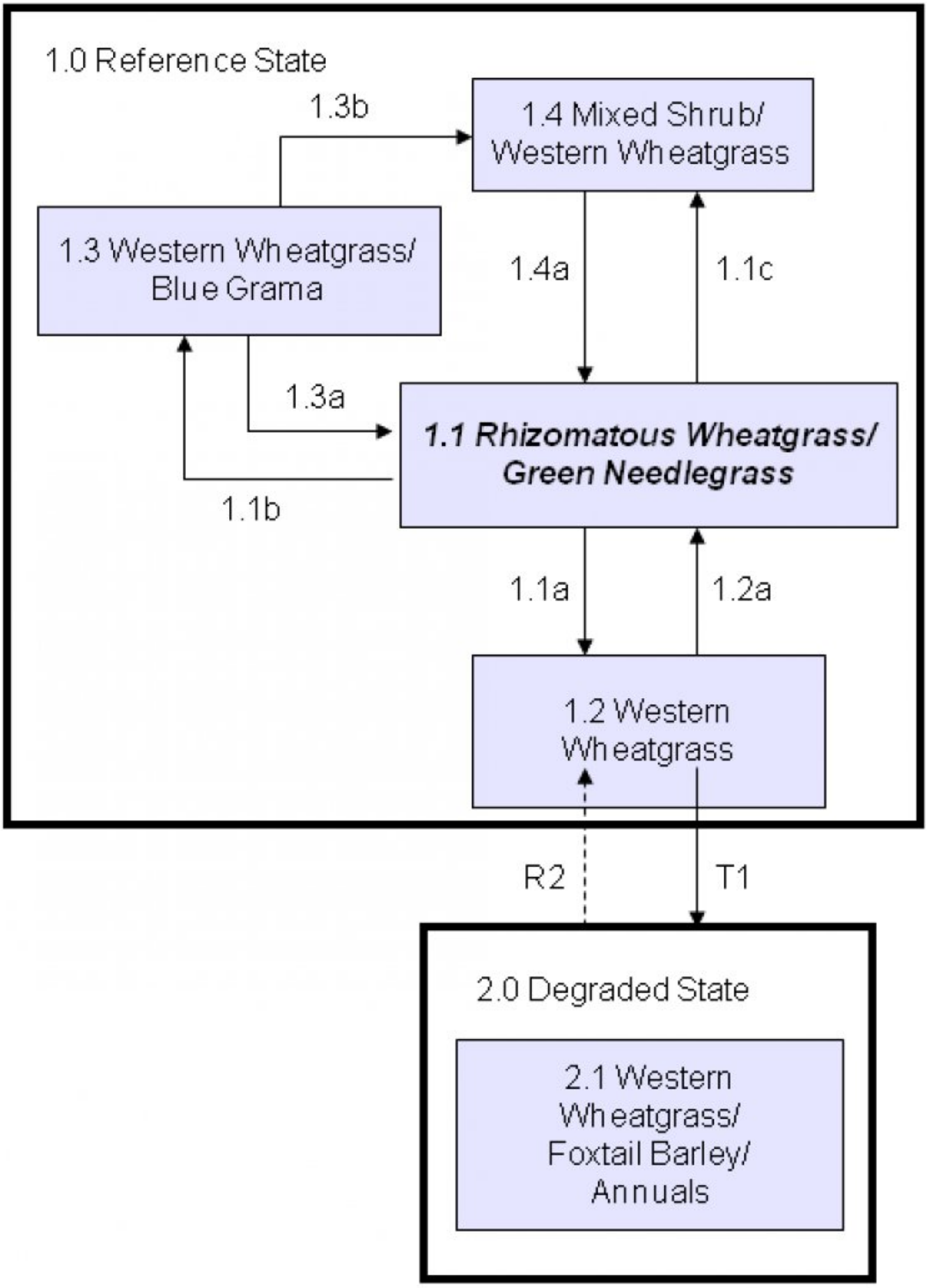
As this site deteriorates, species such as blue grama and sagebrush will increase, and introduced species such as Kentucky bluegrass and Canada thistle will invade the site.

Grasses such as slender wheatgrass, green needlegrass, big bluestem, rhizomatous wheatgrasses, prairie cordgrass, and switchgrass will decrease in frequency and production.

The plant community upon which interpretations are primarily based is the Rhizomatous Wheatgrass/Green Needlegrass Plant Community. This plant community has been determined by studying 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 communities, states, transitional pathways, and thresholds have been determined through similar studies and experience.

The following is a diagram that illustrates the common plant communities that can occur on the site and the transition pathways between communities. The ecological processes are discussed in more detail in the plant community descriptions following the diagram.

State and transition model


1.0 Reference State
1.3b
1.4 Mixed Shrub/ Western Wheatgrass
1.3 Western Wheatgrass/ Blue Grama
1.4a
1.1c
1.3a
1.1 Rhizomatous Wheatgrass/ Green Needlegrass
1.1b
1.1a
1.2a
1.2 Western Wheatgrass
R2
T1
2.0 Degraded State
2.1 Western Wheatgrass/ Foxtail Barley/ Annuals

State 1
Reference

The State narrative is under development.

Dominant plant species

- cottonwood (*Populus*), tree
- boxelder (*Acer negundo*), tree
- American elm (*Ulmus americana*), tree
- silver sagebrush (*Artemisia cana*), shrub
- leadplant (*Amorpha canescens*), shrub
- chokecherry (*Prunus virginiana*), shrub
- big sagebrush (*Artemisia tridentata*), shrub
- rose (*Rosa*), shrub
- western snowberry (*Symphoricarpos occidentalis*), shrub
- western wheatgrass (*Pascopyrum smithii*), grass
- green needlegrass (*Nassella viridula*), grass
- Montana wheatgrass (*Elymus albicans*), grass
- Canada wildrye (*Elymus canadensis*), grass
- composite dropseed (*Sporobolus compositus*), grass
- slender wheatgrass (*Elymus trachycaulus*), grass
- green muhly (*Muhlenbergia ramulosa*), grass
- foxtail barley (*Hordeum jubatum*), grass
- switchgrass (*Panicum virgatum*), grass
- sedge (*Carex*), grass
- blue grama (*Bouteloua gracilis*), grass
- buffalograss (*Bouteloua dactyloides*), grass
- white prairie aster (*Symphyotrichum falcatum*), other herbaceous
- American vetch (*Vicia americana*), other herbaceous
- prairie coneflower (*Ratibida*), other herbaceous
- purple prairie clover (*Dalea purpurea*), other herbaceous
- American licorice (*Glycyrrhiza lepidota*), other herbaceous
- white sagebrush (*Artemisia ludoviciana*), other herbaceous
- goldenrod (*Solidago*), other herbaceous

Community 1.1
Rhizomatous Wheatgrass/Green Needlegrass

The plant community upon which interpretations are primarily based is the Rhizomatous Wheatgrass/Green Needlegrass Plant Community. This is also considered to be climax. Potential vegetation is about 75 to 90 percent grasses or grass-like plants, 5 to 10 percent forbs, 2 to 10 percent shrubs, and 0 to 5 percent trees. The major grasses include rhizomatous wheatgrasses and green needlegrass. Other grass and grass-like species in the plant community include Montana wheatgrass, Canada wildrye, tall dropseed, green muhly, foxtail barley, switchgrass, sedge, blue grama, and buffalograss. Shrubs such as

silver sagebrush, leadplant, chokecherry, big sagebrush, rose, and snowberry are present. Forbs such as white prairie aster, American vetch, prairie coneflower, purple prairie clover, American licorice, cudweed sagewort, and goldenrod are common. Trees occurring on the site include scattered green ash, cottonwood, boxelder, and elm. This plant community is well adapted to the Northern Great Plains climatic conditions. Individual species can vary greatly in production depending on growing conditions (timing and amount of precipitation and temperature). Community dynamics, nutrient cycle, water cycle, and energy flow are functioning properly. Plant litter is properly distributed with very little movement offsite and natural plant mortality is very low. Runoff from adjacent sites and moderate or high available water capacity provides a favorable soil-water-plant relationship.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1745	2100	2390
Shrub/Vine	45	150	285
Forb	110	188	285
Tree	0	62	140
Total	**1900**	**2500**	**3100**

Figure 5. Plant community growth curve (percent production by month). SD5807, Northern Rolling High Plains, 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

Community 1.2
Western Wheatgrass

This plant community results from continuous season-long grazing without adequate recovery periods between each grazing event during the growing season. Recognition of this plant community will enable the land user to implement key management decisions before a significant ecological threshold is crossed. Western wheatgrass is the dominant species. Green needlegrass, slender wheatgrass, and switchgrass are greatly reduced. Forb species include cudweed sagewort, goldenrod, western yarrow, white prairie aster, prairie coneflower, and scurfpea. Leadplant is greatly reduced while other shrub species would tend to be heavily browsed. This plant community is relatively stable and less productive than the Rhizomatous Wheatgrass/Green Needlegrass Plant Community. Reduction of litter and short plant heights result in higher soil temperatures, poor water infiltration rates, and increased runoff. This plant community can occur throughout the site, on spot grazed areas, and around water sources where season-long grazing patterns occur. Soil erosion will be minimal due to the sod forming habit of Kentucky bluegrass.

Table 6. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	820	1282	1725
Forb	70	112	165
Shrub/Vine	10	68	130
Tree	0	38	80
Total	**900**	**1500**	**2100**

Figure 7. Plant community growth curve (percent production by month). SD5806, Northern Rolling High Plains, 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 1.3
Western Wheatgrass/Blue Grama Plant Community

This plant community is the result of continuous season-long grazing and/or from haying the same area over many years. The potential plant community is made up of approximately 80% grasses and grass-like species, 10% forbs, and 5% shrubs. Western wheatgrass and short warm season grasses such as blue grama, buffalograss, and inland saltgrass dominate the site. These grasses can form a sod, limiting production for haying and grazing. Grasses of grass-like plants of secondary importance include green needlegrass, slender wheatgrass, and sedges. Significant forbs found on this site include American licorice, cudweed sagewort, heath aster, scarlet gaura, scarlet globemallow and western yarrow. A significant amount of production and diversity has been lost when compared to the Western Wheatgrass/Green Needlegrass Plant Community. Blue grama, inland saltgrass and buffalograss have increased, while the production of mid and tall warm-season grasses has reduced. Green needlegrass and western wheatgrass have decreased significantly. This plant community is moderately resistant to change, due to grazing tolerance of blue grama and buffalograss. 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.

Table 7. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	910	1169	1425
Forb	65	140	215
Shrub/Vine	25	84	145
Tree	0	7	15
Total	**1000**	**1400**	**1800**

Figure 9. Plant community growth curve (percent production by month). SD5803, Northern Rolling High Plains, cool-season/warm-season co-dominant.. Cool-season, warm-season co-dominant, uplands..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	10	20	28	21	10	5	3	0	0

Community 1.4
Mixed Shrub/Western Wheatgrass

This plant community develops after an extended period of nonuse and exclusion of fire. This plant community will also develop with moderate or heavy continuous seasonal grazing. In either case, shrubs increase and can sometimes dominate the plant community. Cool-season grasses make up the majority of the understory with the balance made up of short warm-season grasses, annual cool-season grasses, and miscellaneous forbs. Western wheatgrass is the dominant grass. Grasses of secondary importance include blue grama, prairie Junegrass, green needlegrass and slender wheatgrass. Woody plants such as big sagebrush, silver sagebrush, and snowberry have increased with canopy cover up to 20 percent. Forbs commonly found in this plant community include cudweed sagewort, goldenrod, western yarrow, and scurfpea. When compared to the Rhizomatous Wheatgrass/Green Needlegrass Plant Community, western wheatgrass has increased, while green needlegrass has decreased. Production of cool-season grasses has also been reduced. This plant community is stable and protected from excessive erosion. The biotic integrity is usually intact, but it can be at risk if dominated by short grasses or shrubs, and if invaded by introduced species.

Table 8. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	910	1628	2055
Shrub/Vine	95	210	365
Forb	95	210	365
Tree	0	52	115
Total	**1100**	**2100**	**2900**

Figure 11. Plant community growth curve (percent production by month). SD5807, Northern Rolling High Plains, 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

Moderate continuous season-long grazing will shift this plant community to the Western Wheatgrass Plant Community.

Pathway 1.1b
Community 1.1 to 1.3

Haying will convert this plant community to the Western Wheatgrass/Blue Grama Plant Community.

Pathway 1.1c
Community 1.1 to 1.4

Moderate, continuous seasonal grazing or nonuse and no fire will convert this plant community to the Mixed Shrub/Western Wheatgrass Plant Community.

Pathway 1.2a
Community 1.2 to 1.1

Prescribed grazing will shift this plant community back to the Rhizomatous Wheatgrass/Green Needlegrass Plant Community.

Pathway 1.3a
Community 1.3 to 1.1

No haying, along with long-term prescribed grazing may eventually shift this community

back to Rhizomatous Wheatgrass/Green Needlegrass.

Conservation practices

Prescribed Grazing

Pathway 1.3b
Community 1.3 to 1.4

Moderate, continuous seasonal grazing may shift this plant community to the Mixed Shrub/Western Wheatgrass Plant Community.

Pathway 1.4a
Community 1.4 to 1.1

Brush control followed by prescribed grazing, will result in a plant community very similar to the Rhizomatous Wheatgrass/Green Needlegrass Plant Community.

Conservation practices

Brush Management
Prescribed Grazing

State 2
Degraded

The State narrative is under development.

Dominant plant species

- western wheatgrass (*Pascopyrum smithii*), grass
- Kentucky bluegrass (*Poa pratensis*), grass
- green needlegrass (*Nassella viridula*), grass
- field brome (*Bromus arvensis*), grass
- common yarrow (*Achillea millefolium*), other herbaceous
- scurfpea (*Psoralidium*), other herbaceous
- white sagebrush (*Artemisia ludoviciana*), other herbaceous
- goldenrod (*Solidago*), other herbaceous
- Canada thistle (*Cirsium arvense*), other herbaceous
- cocklebur (*Xanthium*), other herbaceous

Community 2.1
Western Wheatgrass/Foxtail Barley/Annuals

This plant community developed with heavy continuous season-long grazing. Western

wheatgrass and Kentucky bluegrass dominate the community. Green needlegrass has been greatly reduced. Western yarrow, scurfpea, cudweed sagewort, and goldenrod have increased. Nonnative grasses and forbs such as annual bromes, thistle, and cocklebur will invade this plant community. This plant community is resistant to change to a higher successional plant community due to low plant diversity and competition of the invaded species. A significant amount of production and diversity has been lost when compared to the Rhizomatous Wheatgrass/Green Needlegrass Plant Community. The loss of desirable species has negatively impacted energy flow and nutrient cycling. Water infiltration is reduced significantly. Soil loss may be accelerated where concentrated flows occur. It will take a very long time to restore this plant community back to the Rhizomatous Wheatgrass/Green Needlegrass Plant Community with improved management. Renovation would be very costly.

Table 9. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	445	752	1145
Forb	40	90	150
Shrub/Vine	15	44	75
Tree	0	14	30
Total	**500**	**900**	**1400**

Figure 13. Plant community growth curve (percent production by month). SD5806, Northern Rolling High Plains, 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

Transition T1
State 1 to 2

Moderate, continuous season-long grazing will move this plant community across the ecological threshold to the Western Wheatgrass/Foxtail Barley/Annuals Plant Community.

Restoration pathway R2
State 2 to 1

Long-term prescribed grazing may move this plant community toward the Western Wheatgrass Plant Community. It may eventually return to the Rhizomatous Wheatgrass/Green Needlegrass Plant Community or associated successional plant community stages assuming an adequate seed/vegetative source is available.

Conservation practices

Prescribed Grazing

Additional community tables

Table 10. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Wheatgrasses**			500–1000	
	western wheatgrass	PASM	*Pascopyrum smithii*	375–1000	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	50–250	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	25–250	–
	Montana wheatgrass	ELAL7	*Elymus albicans*	0–125	–
2	**Cool-Season Bunch Grasses**			375–625	
	green needlegrass	NAVI4	*Nassella viridula*	250–625	–
	Canada wildrye	ELCA4	*Elymus canadensis*	0–125	–
	foxtail barley	HOJU	*Hordeum jubatum*	0–125	–
3	**Tall Warm-Season Grasses**			25–250	
	marsh muhly	MURA	*Muhlenbergia racemosa*	0–125	–
	switchgrass	PAVI2	*Panicum virgatum*	0–125	–
	composite dropseed	SPCOC2	*Sporobolus compositus var. compositus*	25–125	–
	prairie cordgrass	SPPE	*Spartina pectinata*	0–75	–
4	**Short-Warm Season Grasses**			50–250	
	buffalograss	BODA2	*Bouteloua dactyloides*	25–125	–
	blue grama	BOGR2	*Bouteloua gracilis*	25–125	–
	saltgrass	DISP	*Distichlis spicata*	0–75	–
	mat muhly	MURI	*Muhlenbergia richardsonis*	0–75	–
5	**Other Native Grasses**			25–125	
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	0–125	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	25–75	–
6	**Grass-Likes**			25–125	

	sedge	CAREX	*Carex*	25–125	–
	rush	JUNCU	*Juncus*	0–75	–
	spikerush	ELEOC	*Eleocharis*	0–50	–
Forb					
8	**Forbs**			125–250	
	Forb, native	2FN	*Forb, native*	25–100	–
	Maximilian sunflower	HEMA2	*Helianthus maximiliani*	25–75	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	25–75	–
	false boneset	BREU	*Brickellia eupatorioides*	0–50	–
	wavyleaf thistle	CIUN	*Cirsium undulatum*	25–50	–
	purple prairie clover	DAPU5	*Dalea purpurea*	25–50	–
	western yarrow	ACMIO	*Achillea millefolium var. occidentalis*	25–50	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	25–50	–
	scurfpea	PSORA2	*Psoralidium*	25–50	–
	goldenrod	SOLID	*Solidago*	25–50	–
	white prairie aster	SYFA	*Symphyotrichum falcatum*	25–50	–
	American vetch	VIAM	*Vicia americana*	25–50	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	0–25	–
	starry false lily of the valley	MAST4	*Maianthemum stellatum*	0–25	–
	mint	MENTH	*Mentha*	0–25	–
	scarlet beeblossom	GACO5	*Gaura coccinea*	0–25	–
Shrub/Vine					
9	**Shrubs**			50–250	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–75	–
	silver sagebrush	ARCA13	*Artemisia cana*	25–75	–
	western snowberry	SYOC	*Symphoricarpos occidentalis*	25–75	–
	chokecherry	PRVI	*Prunus virginiana*	0–75	–
	rose	ROSA5	*Rosa*	25–50	–
	willow	SALIX	*Salix*	0–50	–
	prairie sagewort	ARFR4	*Artemisia frigida*	25–50	–
	big sagebrush	ARTR2	*Artemisia tridentata*	0–50	–

	big sagebrush	ARTRT2	*Artemisia tridentata*	0–50	
	fourwing saltbush	ATCA2	*Atriplex canescens*	0–50	–
	leadplant	AMCA6	*Amorpha canescens*	25–50	–
Tree					
10	**Trees**			0–125	
	Tree	2TREE	*Tree*	0–125	–
	boxelder	ACNE2	*Acer negundo*	0–125	–
	green ash	FRPE	*Fraxinus pennsylvanica*	0–125	–
	plains cottonwood	PODEM	*Populus deltoides ssp. monilifera*	0–125	–
	American elm	ULAM	*Ulmus americana*	0–125	–

Table 11. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Wheatgrasses**			375–675	
	western wheatgrass	PASM	*Pascopyrum smithii*	375–675	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	15–75	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	0–75	–
	Montana wheatgrass	ELAL7	*Elymus albicans*	0–45	–
2	**Cool-Season Bunch Grasses**			150–300	
	green needlegrass	NAVI4	*Nassella viridula*	75–225	–
	foxtail barley	HOJU	*Hordeum jubatum*	15–120	–
	Canada wildrye	ELCA4	*Elymus canadensis*	0–45	–
3	**Tall Warm-Season Grasses**			15–75	
	composite dropseed	SPCOC2	*Sporobolus compositus var. compositus*	15–75	–
	marsh muhly	MURA	*Muhlenbergia racemosa*	0–15	–
	switchgrass	PAVI2	*Panicum virgatum*	0–15	–
4	**Short-Warm Season Grasses**			30–180	
	buffalograss	BODA2	*Bouteloua dactyloides*	15–75	–
	blue grama	BOGR2	*Bouteloua gracilis*	15–75	–
	saltgrass	DISP	*Distichlis spicata*	0–75	–
	mat muhly	MURI	*Muhlenbergia*	0–75	–

			richardsonis		
5	**Other Native Grasses**			15–75	
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	0–75	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	15–45	–
6	**Grass-Likes**			15–75	
	sedge	CAREX	*Carex*	15–75	–
	rush	JUNCU	*Juncus*	0–45	–
	spikerush	ELEOC	*Eleocharis*	0–30	–
7	**Non-Native Grasses**			15–150	
	bluegrass	POA	*Poa*	15–150	–
	cheatgrass	BRTE	*Bromus tectorum*	15–75	–
Forb					
8	**Forbs**			75–150	
	Forb, introduced	2FI	*Forb, introduced*	0–75	–
	Forb, native	2FN	*Forb, native*	15–75	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	15–60	–
	western yarrow	ACMIO	*Achillea millefolium var. occidentalis*	15–45	–
	scurfpea	PSORA2	*Psoralidium*	15–45	–
	goldenrod	SOLID	*Solidago*	15–45	–
	white prairie aster	SYFA	*Symphyotrichum falcatum*	15–45	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	15–30	–
	Maximilian sunflower	HEMA2	*Helianthus maximiliani*	0–30	–
	wavyleaf thistle	CIUN	*Cirsium undulatum*	0–30	–
	purple prairie clover	DAPU5	*Dalea purpurea*	0–15	–
	scarlet beeblossom	GACO5	*Gaura coccinea*	0–15	–
	mint	MENTH	*Mentha*	0–15	–
	American vetch	VIAM	*Vicia americana*	0–15	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	0–15	–
Shrub/Vine					
9	**Shrubs**			15–120	
	western snowberry	SYOC	*Symphoricarpos occidentalis*	15–60	–

	prairie sagewort	ARFR4	*Artemisia frigida*	15–45	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–45	–
	silver sagebrush	ARCA13	*Artemisia cana*	15–30	–
	rose	ROSA5	*Rosa*	15–30	–
	big sagebrush	ARTR2	*Artemisia tridentata*	0–15	–
	chokecherry	PRVI	*Prunus virginiana*	0–15	–
	leadplant	AMCA6	*Amorpha canescens*	0–15	–
Tree					
10	**Trees**			0–75	
	Tree	2TREE	*Tree*	0–75	–
	boxelder	ACNE2	*Acer negundo*	0–75	–
	green ash	FRPE	*Fraxinus pennsylvanica*	0–75	–
	plains cottonwood	PODEM	*Populus deltoides ssp. monilifera*	0–75	–
	American elm	ULAM	*Ulmus americana*	0–75	–

Table 12. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Wheatgrasses**			140–490	
	western wheatgrass	PASM	*Pascopyrum smithii*	140–490	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	0–70	–
2	**Cool-Season Bunchgrasses**			14–70	
	foxtail barley	HOJU	*Hordeum jubatum*	14–70	–
	green needlegrass	NAVI4	*Nassella viridula*	0–70	–
3	**Tall Warm-Season Grasses**			0–42	
	composite dropseed	SPCOC2	*Sporobolus compositus var. compositus*	0–42	–
4	**Short Warm-Season Grasses**			210–490	
	blue grama	BOGR2	*Bouteloua gracilis*	70–350	–
	saltgrass	DISP	*Distichlis spicata*	70–210	–
	buffalograss	BODA2	*Bouteloua dactyloides*	0–140	–
	mat muhly	MURI	*Muhlenbergia richardsonis*	14–70	–

5	**Other Native Grasses**			14–70	
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	0–70	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	14–42	–
6	**Grass-likes**			14–70	
	sedge	CAREX	*Carex*	0–70	–
	spikerush	ELEOC	*Eleocharis*	0–70	–
	rush	JUNCU	*Juncus*	0–70	–
7	**Non-native Grasses**			0–70	
	cheatgrass	BRTE	*Bromus tectorum*	0–70	–
	bluegrass	POA	*Poa*	0–70	–
Forb					
8	**Forbs**			70–210	
	Forb, introduced	2FI	*Forb, introduced*	0–70	–
	Forb, native	2FN	*Forb, native*	14–70	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	14–70	–
	curlycup gumweed	GRSQ	*Grindelia squarrosa*	14–70	–
	scurfpea	PSORA2	*Psoralidium*	14–56	–
	goldenrod	SOLID	*Solidago*	14–42	–
	white prairie aster	SYFA	*Symphyotrichum falcatum*	14–42	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	0–42	–
	western yarrow	ACMIO	*Achillea millefolium var. occidentalis*	14–42	–
	curly dock	RUCR	*Rumex crispus*	0–28	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	0–14	–
Shrub/Vine					
9	**Shrubs**			28–140	
	western snowberry	SYOC	*Symphoricarpos occidentalis*	14–98	–
	silver sagebrush	ARCA13	*Artemisia cana*	0–56	–
	prairie sagewort	ARFR4	*Artemisia frigida*	14–56	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–42	–
	rose	ROSA5	*Rosa*	0–28	–
	big sagebrush	ARTR2	*Artemisia tridentata*	0–14	–

Tree					
10	**Trees**			0–70	
	Tree	2TREE	*Tree*	0–70	–
	boxelder	ACNE2	*Acer negundo*	0–70	–
	green ash	FRPE	*Fraxinus pennsylvanica*	0–70	–
	plains cottonwood	PODEM	*Populus deltoides ssp. monilifera*	0–70	–
	American elm	ULAM	*Ulmus americana*	0–70	–

Table 13. Community 1.4 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Wheatgrasses**			525–840	
	western wheatgrass	PASM	*Pascopyrum smithii*	420–840	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	21–210	–
	Montana wheatgrass	ELAL7	*Elymus albicans*	0–105	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	21–105	–
2	**Cool-Season Bunch Grasses**			210–420	
	green needlegrass	NAVI4	*Nassella viridula*	210–420	–
	Canada wildrye	ELCA4	*Elymus canadensis*	0–105	–
	foxtail barley	HOJU	*Hordeum jubatum*	0–105	–
3	**Tall Warm-Season Grasses**			21–105	
	composite dropseed	SPCOC2	*Sporobolus compositus var. compositus*	21–105	–
	prairie cordgrass	SPPE	*Spartina pectinata*	0–21	–
	marsh muhly	MURA	*Muhlenbergia racemosa*	0–21	–
	switchgrass	PAVI2	*Panicum virgatum*	0–21	–
4	**Short-Warm Season Grasses**			42–210	
	buffalograss	BODA2	*Bouteloua dactyloides*	0–105	–
	blue grama	BOGR2	*Bouteloua gracilis*	21–105	–
	saltgrass	DISP	*Distichlis spicata*	21–105	–
	mat muhly	MURI	*Muhlenbergia richardsonis*	0–63	–
5	**Other Native Grasses**			21–105	

5	**Other Native Grasses**			21–105	
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	0–105	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	21–42	–
6	**Grass-Likes**			21–105	
	sedge	CAREX	*Carex*	21–105	–
	rush	JUNCU	*Juncus*	0–42	–
	spikerush	ELEOC	*Eleocharis*	0–21	–
7	**Non-Native Grasses**			21–105	
	cheatgrass	BRTE	*Bromus tectorum*	21–105	–
	bluegrass	POA	*Poa*	21–105	–
Forb					
8	**Forbs**			105–315	
	Forb, introduced	2FI	*Forb, introduced*	0–105	–
	Forb, native	2FN	*Forb, native*	21–105	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	21–105	–
	scurfpea	PSORA2	*Psoralidium*	21–84	–
	goldenrod	SOLID	*Solidago*	21–63	–
	white prairie aster	SYFA	*Symphyotrichum falcatum*	21–63	–
	western yarrow	ACMIO	*Achillea millefolium var. occidentalis*	21–63	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	21–63	–
	Maximilian sunflower	HEMA2	*Helianthus maximiliani*	21–63	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	0–42	–
	wavyleaf thistle	CIUN	*Cirsium undulatum*	21–42	–
	purple prairie clover	DAPU5	*Dalea purpurea*	21–42	–
	scarlet beeblossom	GACO5	*Gaura coccinea*	0–21	–
	American vetch	VIAM	*Vicia americana*	0–21	–
	starry false lily of the valley	MAST4	*Maianthemum stellatum*	0–21	–
	mint	MENTH	*Mentha*	0–21	–
	false boneset	BREU	*Brickellia eupatorioides*	0–21	–
Shrub/Vine					
9	**Shrubs**			105–315	
	western snowberry	SYOC	*Symphoricarpos*	21–168	

	western snowberry	SYOC	*Symphoricarpos occidentalis*	21–105	–
	silver sagebrush	ARCA13	*Artemisia cana*	21–105	–
	chokecherry	PRVI	*Prunus virginiana*	0–105	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–105	–
	big sagebrush	ARTR2	*Artemisia tridentata*	0–84	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	0–63	–
	rose	ROSA5	*Rosa*	21–63	–
	willow	SALIX	*Salix*	0–63	–
	leadplant	AMCA6	*Amorpha canescens*	21–63	–
	prairie sagewort	ARFR4	*Artemisia frigida*	21–42	–
Tree					
10	**Trees**			0–105	
	Tree	2TREE	*Tree*	0–105	–
	boxelder	ACNE2	*Acer negundo*	0–105	–
	green ash	FRPE	*Fraxinus pennsylvanica*	0–105	–
	plains cottonwood	PODEM	*Populus deltoides ssp. monilifera*	0–105	–
	American elm	ULAM	*Ulmus americana*	0–105	–

Table 14. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Wheatgrasses**			90–315	
	western wheatgrass	PASM	*Pascopyrum smithii*	90–315	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	0–45	–
2	**Cool-Season Bunch Grasses**			18–72	
	foxtail barley	HOJU	*Hordeum jubatum*	18–72	–
	green needlegrass	NAVI4	*Nassella viridula*	0–45	–
3	**Tall Warm-Season Grasses**			0–27	
	composite dropseed	SPCOC2	*Sporobolus compositus var. compositus*	0–27	–
4	**Short-Warm Season Grasses**			18–135	
	saltgrass	DISP	*Distichlis spicata*	9–90	–

	buffalograss	BODA2	*Bouteloua dactyloides*	0–45	–
	blue grama	BOGR2	*Bouteloua gracilis*	9–45	–
	mat muhly	MURI	*Muhlenbergia richardsonis*	0–27	–
5	**Other Native Grasses**			9–45	
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	0–45	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	9–18	–
6	**Grass-Likes**			9–63	
	spikerush	ELEOC	*Eleocharis*	0–36	–
	rush	JUNCU	*Juncus*	0–36	–
	sedge	CAREX	*Carex*	9–27	–
7	**Non-Native Grasses**			90–225	
	bluegrass	POA	*Poa*	45–180	–
	cheatgrass	BRTE	*Bromus tectorum*	9–90	–
Forb					
8	**Forbs**			45–135	
	Forb, introduced	2FI	*Forb, introduced*	9–90	–
	Forb, native	2FN	*Forb, native*	9–45	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	9–45	–
	goldenrod	SOLID	*Solidago*	9–45	–
	white prairie aster	SYFA	*Symphyotrichum falcatum*	9–45	–
	western yarrow	ACMIO	*Achillea millefolium var. occidentalis*	9–36	–
	scurfpea	PSORA2	*Psoralidium*	9–27	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	0–9	–
Shrub/Vine					
9	**Shrubs**			18–72	
	prairie sagewort	ARFR4	*Artemisia frigida*	9–45	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–45	–
	western snowberry	SYOC	*Symphoricarpos occidentalis*	9–45	–
	silver sagebrush	ARCA13	*Artemisia cana*	0–9	–
	rose	ROSA5	*Rosa*	0–9	–
Tree					

10	**Trees**			0–27	
	Tree	2TREE	*Tree*	0–27	–
	boxelder	ACNE2	*Acer negundo*	0–27	–
	green ash	FRPE	*Fraxinus pennsylvanica*	0–27	–
	plains cottonwood	PODEM	*Populus deltoides ssp. monilifera*	0–27	–
	American elm	ULAM	*Ulmus americana*	0–27	–

Animal community

Animal Community – Wildlife Interpretations
Major Land Resource Area (MLRA) 58D lies within the drier portion of Northern mixed-grass prairie ecosystem where sagebrush steppes to the west yield to grassland steppes to the east. Prior to European settlement, this area consisted of diverse grass/shrub land habitats interspersed with varying densities of depressional, instream wetlands, and woody riparian corridors. These habitats provided critical life cycle components for many of its users. Many species of grassland birds, small mammals, reptiles, amphibians, and herds of roaming bison, elk, and pronghorn were among the inhabitants adapted to this semi-arid region. Roaming herbivores, as well as, several small mammal and insect species, were the primary consumers linking the grassland resources to predators such as the wolf, mountain lion, and grizzly bear, as well as, smaller carnivores such as the coyote, bobcat, fox, and raptors. The black-tailed prairie dog was once abundant; however, the species remains a keystone species within its range. The black-footed ferret, burrowing owl, ferruginous hawk, mountain plover, and swift fox were associated with prairie dog complexes.

Historically, the Northern mixed-grass prairie was a disturbance-driven ecosystem with fire, herbivory, and climate functioning as the primary disturbance factors either singly or in combination. Following European settlement, livestock grazing, cropland conversion, elimination of fire, energy development, and other anthropogenic factors influenced species composition and abundance. Introduced and invasive species further impacted plant and animal communities. The bison was a historical keystone species but have been extirpated as a free-ranging herbivore. The loss of the bison, reduction of prairie dog colonies, and loss of fire as ecological drivers greatly influenced the character of the remaining native plant communities and altered wildlife habitats. Human development has reduced habitat quality for area-sensitive species.

Within MLRA 58D, the Clayey Overflow Ecological Site (ES) provides upland grassland cover with an associated forb, shrub, and tree component. It was typically part of an expansive grassland landscape that included combinations of Shallow Loamy, Shallow Clayey, Thin Loamy, Thin Claypan, Sandy, Sandy Claypan, Loamy, Sandy Terrace, and Clayey ESs.

Although this ES is primarily dominated by western wheatgrass, this site can support a plant community composed of various age classes of elm, green ash, and boxelder; with a shrub component of chokecherry, western snowberry, silver buffaloberry, etc. The presence or absence of this tree/shrub component is an important factor influencing wildlife species composition.
This site is subject to invasion of grass species such as annual bromegrasses and Kentucky bluegrass. Woody species such as Russian olive and Tamarisk (salt cedar), may invade this site.

This site provides habitat for grassland and shrub thicket nesting birds, small rodents, bats, mammalian predators, and a variety of reptiles, amphibians, and insects. Within the MLRA, this site provides the suitable habitat for numerous riparian associated species. This site provides foraging and brood rearing habitat for upland game birds such as greater sage-grouse and sharp-tailed grouse. However, due to the presence of invasive grass and/or woody species ground nesting birds, reproduction is reduced.

Rhizomatous Wheatgrass/Green Needlegrass: This site is dominated by western wheatgrass and green needlegrass with a shrub community generally dominated by western snowberry that favors grazers and mixed-feeders, such as white-tailed deer. Plant communities associated with shrub thickets and low shrubs provide habitat for songbirds such as brown thrasher, yellow warbler, gray catbird, Say’s phoebe, loggerhead shrike, Lazuli bunting, and yellow breasted chat. Raptors such as red-tailed hawk, Swainson’s hawk, American kestrel, and great-horned owl may use this site. Insects, such as pollinators, play a limited role in maintaining the forb community but provide a significant forage base for birds and other species. Diverse prey populations are available for grassland raptors and mammalian predators, especially bobcat.

Although this site provides a lower diversity of grasses, forbs, and shrubs, the site does provide limited nutrition levels for small and large herbivores including voles, mice, thirteen-lined ground squirrel, Eastern cottontail rabbit, white-tailed jackrabbit, and deer. This ES provides excellent fawning habitat for white-tailed deer. The relatively tall stature of this plant community provides suitable thermal, protective, and escape cover for small and large mammals. This plant community provides limited habitat for amphibians, mostly toads. Numerous reptile species such as lizards, bull, and garter snakes may occupy the site. Introduced bird species such as ring-necked pheasant and gray partridge will use this site.

Mixed Shrub/Western Wheatgrass: Resulting from moderate, continuous season-long grazing, nonuse, or reduction in fire frequency, shrubs and western wheatgrass will dominate. Shrub diversity and density has increased. The minor tree component remains largely unchanged. Livestock damage to trees is often noticeable. The increase in the shrub component results in increased habitat for yellow warbler, gray catbird, loggerhead shrike, Bell’s vireo, brown thrasher, Lazuli bunting, and yellow breasted chat. When present, the tree component continues to provide habitat for red-tailed hawk, American kestrel, and Say’s phoebe. This plant community provides limited habitat for amphibians,

mostly toads. Numerous reptile species such as lizards, bull, and garter snakes may occupy the site.

Western Wheatgrass/Blue Grama: Resulting from haying, the plant community will become dominated by western wheatgrass and blue grama. The forb and shrub diversity will be dramatically reduced. The shift from to western wheatgrass and blue grama will result in a significant change to the wildlife community. Almost all shrub or low shrub dependent birds will not use this site due to haying of the shrubs, especially western snowberry. Small mammals such as voles and mice will continue to use the site. Predators utilizing this plant community include the coyote, red fox, long-tailed weasel, raccoon, and bobcat.

Western Wheatgrass: Resulting from moderate, continuous season-long grazing western wheatgrass will dominate this site. Tree and shrub diversity and abundance have either been greatly decreased or eliminated. The reduction of the tree and shrub component results in either an elimination or significant reduction of tree and shrub utilizing birds such as brown thrasher, yellow warbler, gray catbird, loggerhead shrike, Lazuli bunting, and yellow breasted chat. Grassland nesting bird species will increase. Small mammals such as voles and mice will continue to use the site. Predators utilizing this plant community include the coyote, red fox, and long-tailed weasel.

Western Wheatgrass/Foxtail Barley/Annuals: This plant community develops under moderate, continuous season-long grazing of western wheatgrass. The dominant vegetation includes foxtail barley and annual grasses, forbs, invaders, and early successional biennial and perennial species. Plant species from adjacent ESs may become minor components of this plant community. The community is susceptible to invasion of annual bromegrasses, and other nonnative species due to severe soil disturbances and relatively high percent of bare ground.

Soil erosion is potentially high, impacting offsite aquatic habitats through increased runoff, nutrient, and sediment loads. Reduced surface cover, low plant density, low plant vigor, loss of root biomass, and soil compaction, all contribute to decreased wildlife abundance and diversity.

Since secondary succession is highly variable plant and wildlife species will vary. This plant community provides habitat for generalist or early successional species.

Animal Community – Grazing Interpretations
As this site improves in condition through proper management (from the more shortgrass dominated plant communities to the interpretive plant community), the advantage for livestock production includes: higher forage production from cool-season grasses, improved early spring forage production, and higher water infiltration. The disadvantage for livestock include: reduction in cool-/warm-season grass mix which would provides better management flexibility, less plant diversity, and a potential increase in soil erosion. The Western Wheatgrass/Foxtail Barley/Annuals Plant Community is of limited value for

livestock production.

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 C. Infiltration and runoff potential for this site varies from moderate to high 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 exception would be where shortgrasses form a strong sod and dominate the site. Normally, 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 opportunities for upland game species. The wide varieties of plants which bloom from spring until fall have an esthetic value that appeals to visitors.

Wood products

No appreciable wood products are 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 and experience were also used. Those involved in developing this site description include: Ryan Beer, Range Management Specialist (RMS), NRCS; Stan Boltz, RMS, NRCS; Dave Dewald, Wildlife BIO, NRCS; Jody Forman, RMS, NRCS; Dennis Froemke, RMS, NRCS; Cheryl Nielsen, RMS, NRCS; Jeff Printz, RMS, NRCS; Mike Stirling, RMS, NRCS; and Darrell Vanderbusch, 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/)

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

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All ecological sites were updated by Rick L. Peterson, ESS, Rapid City, SSO in FY20.

The ESDs were available for QC review by Mark Hayek, Emily Helms, Ryan Beer, and Mitch Faulkner.

All ecological sites were then reviewed and approved at the Provisional Level by David Kraft, Regional ESS, Salina, KS in September 2020.

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)	Stan Boltz, Ryan Beer, Mitch Iverson, Thad Berrett, Cheryl Nielsen
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Date	05/06/2010
Approved by	Suzanne Mayne-Kinney
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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2. **Presence of water flow patterns:** Typically none or barely visible. Evidence of water flow may be present after high overland flow events or flooding from adjacent streams, but vegetation normally remains intact.

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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):** 0 to 5 percent is typical.

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5. **Number of gullies and erosion associated with gullies:** None typical, however limited headcutting may form after high runoff or flooding events. Existing gullies should be stabilized with good vegetative cover.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** None typical, but limited deposition may occur after major runoff or flooding events.

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

small and medium size classes will move after average to high rainfall events. Litter does not travel far, typically being trapped in small bunches by the extensive vegetative cover. Litter movement may be fairly extensive after major runoff or flooding events.

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil aggregate stability ratings should typically be 5 to 6, normally 6. Surface organic matter adheres to the soil surface. Soil surface fragments will typically retain structure indefinitely when dipped in distilled water.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** A-horizon should be 4 to 10 inches thick with mollic (dark) colors when moist. Structure typically is medium subangular blocky in the upper A-horizon.

---

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

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None – when dry, B horizons can be hard and appear to be compacted, but no platy structure will be present.

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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 rhizomatous grasses >> Mid/tall cool-season bunchgrasses >

    Sub-dominant: Tall warm-season rhizomatous grasses = short warm-season grasses = forbs >

    Other: Shrubs > Grass-likes > Trees

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Very little evidence of decadence or mortality. Bunch grasses have strong, healthy centers and shrubs are vigorous.

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):** Production ranges from 1,900-3,100 lbs./acre (air-dry weight). Reference value production is 2,500 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:** State and local noxious weeds, Kentucky bluegrass

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