

Ecological site R058DY022SD Loamy Terrace

Accessed: 05/03/2024

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.

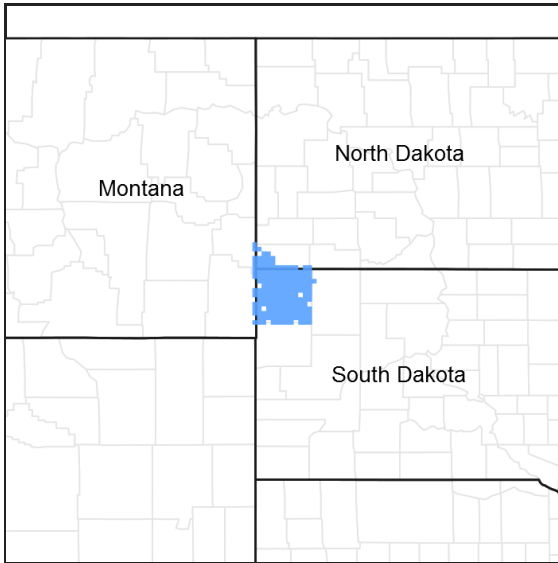


Figure 1. Mapped extent

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: 43e – Sagebrush Steppe.

Associated sites

R058DY009SD	Sandy
R058DY010SD	Loamy
R058DY020SD	Loamy Overflow

Similar sites

R058DY010SD	Loamy Loamy [more western wheatgrass; less needleandthread; less production]
R058DY020SD	Loamy Overflow Loamy Overflow [more big bluestem; more production]

Table 1. Dominant plant species

Tree	Not specified
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Shrub	Not specified
Herbaceous	(1) <i>Pascopyrum smithii</i> (2) <i>Nassella viridula</i>

Physiographic features

This site occurs on nearly level stream terraces.

Table 2. Representative physiographic features

Landforms	(1) Stream terrace (2) Flood plain
Flooding duration	Very brief (4 to 48 hours)
Flooding frequency	None to rare
Ponding frequency	None
Elevation	701–1,219 m
Slope	1–4%
Water table depth	203 cm
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 in 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, North Dakota (ND)), to about 20°F (Baker, Montana (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 (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 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 can 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)	123 days
Freeze-free period (average)	140 days
Precipitation total (average)	406 mm

Influencing water features

No significant water features influence this site.

Soil features

The soils on this site range from fine sandy loam to silty clay surface textures and have slopes of one to four percent. These soils are well drained and formed in alluvium derived from shale or sandstone. The surface layer is five to nine inches thick. The texture of the subsurface layers range from loamy fine sand to clay. This site should show no evidence of rills, wind scoured areas, or pedestalled plants. Water flow paths are broken, irregular in appearance, or discontinuous. The soil surface is stable and intact.

These soils are susceptible mainly to water erosion typically as a result of flooding events. Erosion may occur with a loss of vegetative cover. Loss of 50 percent or more of the surface layer of the soils on this site can result in a shift in species composition and/or production.

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) Fine sandy loam (2) Loam (3) Silty clay
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately slow to moderate
Soil depth	203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	12.7–15.24 cm
Calcium carbonate equivalent (0-101.6cm)	0–25%
Electrical conductivity (0-101.6cm)	0–8 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–2
Soil reaction (1:1 water) (0-101.6cm)	6.1–9
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

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.

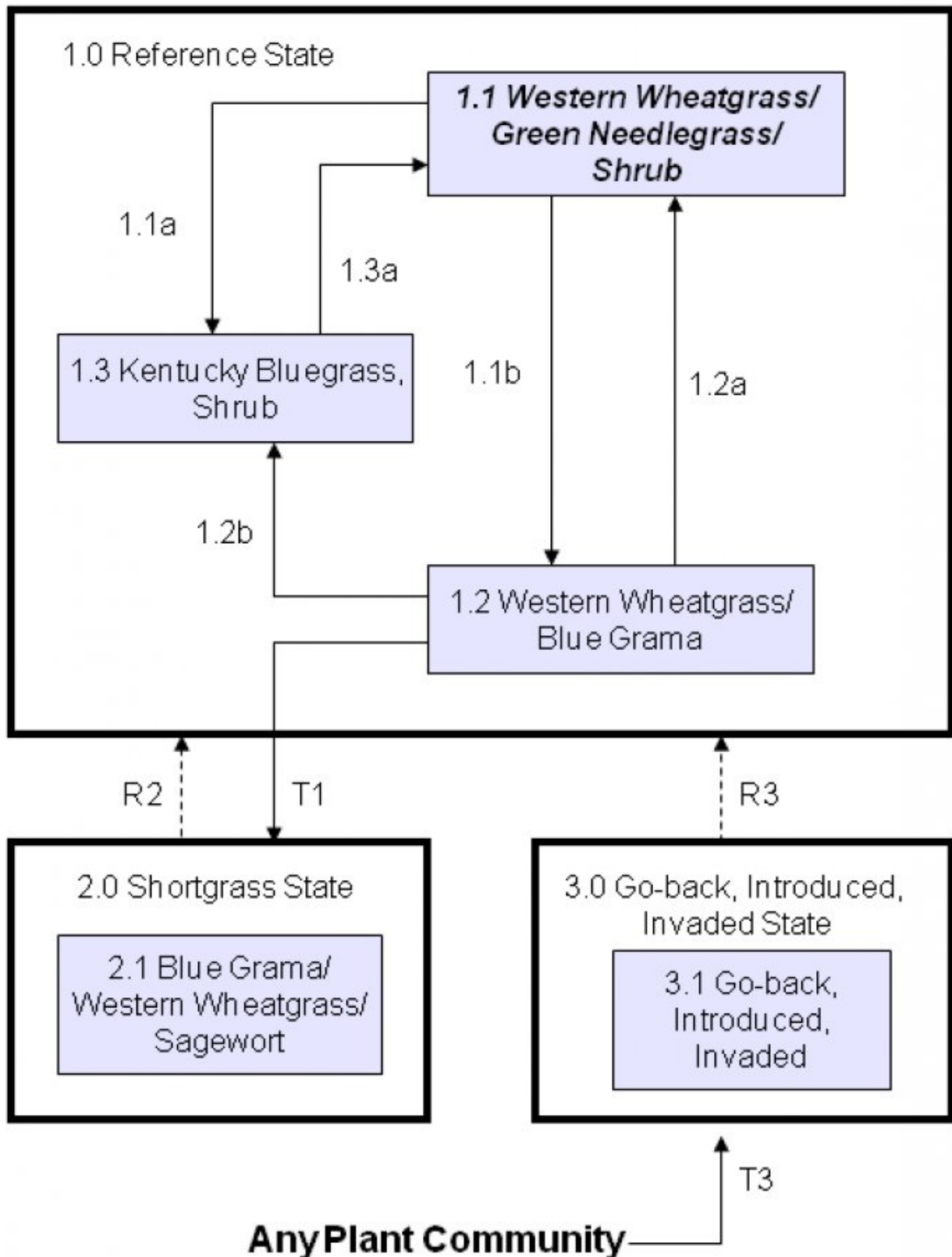
A high percentage of these areas have been tilled in the past and have been planted to alfalfa for haying or are in a winter wheat/fallow rotation. Also, many of these areas are located in good winter livestock areas and are used as calving/feeding areas. Very few areas exist that have not had severe soil disturbance. Many areas that have not been tilled have been continuously hayed resulting in a mono-culture of western wheatgrass. Continuous grazing

without adequate recovery periods following each grazing occurrence over several years causes this site to depart from the Western Wheatgrass/Green Needlegrass/Shrub Plant Community. Species such as blue grama will initially increase. Western wheatgrass, green needlegrass, and prairie sandreed will decrease in frequency and production. Extended periods of nonuse and/or lack of fire will result in a plant community having high litter levels, which favors an increase in Kentucky bluegrass and/or annual brome grass and in time, shrubs and trees such as western snowberry, chokecherry, and green ash.

The plant community upon which interpretations are primarily based is the Western Wheatgrass/Green Needlegrass/Shrub 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



State 1 Reference

The State narrative is under development.

Community 1.1

Western Wheatgrass/Green Needlegrass/Shrubs

The plant community upon which interpretations are primarily based is the Western Wheatgrass/Green Needlegrass/Shrub Plant Community. This is also considered to be climax. This plant community can be found on areas that are properly managed with prescribed grazing. The potential vegetation is about 75 to 85 percent grasses and grass-like plants, 5 to 10 percent forbs, 10 to 15 percent shrubs, and 0 to 2 percent trees. Major grasses include western wheatgrass, green needlegrass, and prairie sandreed. Major forbs and shrubs include cudweed sagewort, Maximilian sunflower, mint, white prairie aster, silver sagebrush, and western snowberry. Scattered green ash, plains cottonwood, boxelder, and American elm may occur. 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. The diversity in plant species allows for high drought tolerance. 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 (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1524	2214	2881
Shrub/Vine	247	351	448
Forb	135	210	308
Tree	–	28	62
Total	1906	2803	3699

Figure 5. Plant community growth curve (percent production by month). SD5802, Northern Rolling High Plains, 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

Western Wheatgrass/Blue Grama

This plant community can slowly develop from the adverse effects of continuous 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. Blue grama and western wheatgrass are the dominant species. Green needlegrass has been greatly reduced. Forb species include cudweed sagewort, white prairie aster, goldenrod, green sagewort, scurfpea, and western yarrow. The dominant shrubs include fringed sagewort, silver sagebrush, and western snowberry. This plant community is relatively stable and less productive than the Western Wheatgrass/Green Needlegrass/Shrub Plant Community. Reduction of litter and short plant heights result in higher soil temperatures, poor water infiltration rates, increased runoff, and high evapotranspiration rates. 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 blue grama.

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1166	1601	1889
Shrub/Vine	90	143	213
Forb	90	143	213
Tree	–	18	39
Total	1346	1905	2354

Figure 7. 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 1.3 Kentucky Bluegrass/Shrub

This plant community develops after an extended period of nonuse and exclusion of fire. Eventually litter levels become high enough to reduce native grass vigor, diversity, and density. Kentucky bluegrass dominates this plant community. Common forbs include sweetclover, cudweed sagewort, and goldenrod species. Shrubs such as western snowberry and/or silver sagebrush, buffaloberry, and chokecherry will increase in density and cover and eventually tree species such as green ash. This plant community is resistant to change without prescribed grazing and/or fire. The combination of both grazing and fire is most effective in moving this plant community toward the Western Wheatgrass/Green Needlegrass/Shrub Plant Community. Soil erosion is low but runoff will be increased. Once the advanced stage of this plant community is reached, time and external resources will be needed to see a recovery in the diversity of the site.

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1356	1659	1877
Shrub/Vine	286	448	673
Forb	39	112	202
Tree	–	22	50
Total	1681	2241	2802

Figure 9. Plant community growth curve (percent production by month). SD5801, Northern Rolling High Plains, cool-season dominant.. Cool-season dominant, uplands..

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 1.1b Community 1.1 to 1.2

Heavy, continuous grazing will convert the plant community to the Western Wheatgrass/Blue Grama Plant Community. Continuous seasonal (i.e., spring) grazing will convert the plant community to the Western Wheatgrass/Blue Grama Plant Community.

Pathway 1.1a Community 1.1 to 1.3

Nonuse and lack of fire for extended periods of time will convert this plant community to the Kentucky Bluegrass/Shrub Plant Community.

Pathway 1.2a Community 1.2 to 1.1

Prescribed grazing with adequate recovery periods following each grazing event and proper stocking will shift this plant community back to the Western Wheatgrass/Green Needlegrass/Shrub Plant Community.

Conservation practices

Prescribed Grazing

Pathway 1.2b

Community 1.2 to 1.3

Non-use and lack of fire for extended periods of time will convert this plant community to the Kentucky Bluegrass/Shrub Plant Community.

Pathway 1.3a

Community 1.3 to 1.1

Prescribed grazing combined with brush management will move this plant community to the Western Wheatgrass/Green Needlegrass/Shrub Plant Community.

Conservation practices

Prescribed Grazing

State 2

Shortgrass

The State narrative is under development.

Community 2.1

Blue Grama/Western Wheatgrass/Sagewort

This plant community developed with heavy continuous grazing without adequate recovery periods between grazing events. Blue grama with an evenly scattered overstory of western wheatgrass, cudweed sagewort, and fringed sagewort dominates the community. The western wheatgrass is low in vigor. Green needlegrass has been mostly removed. Cudweed sagewort, goldenrod, green sagewort, scurfpea, and western yarrow have increased. Key shrubs have been severely reduced in vigor or removed completely. Where silver sagebrush is the dominant shrub, remnants will remain scattered throughout the site which protect some of the remaining decreaseers such as green needlegrass. Remnant trees remain but regeneration is not occurring. This plant community is resistant to change due to grazing tolerance of blue grama. A significant amount of production and diversity has been lost when compared to the Western Wheatgrass/Green Needlegrass Plant Community. Loss of cool-season grasses, tall warm-season grasses, shrub component, and nitrogen fixing forbs have negatively impacted energy flow and nutrient cycling. Water infiltration is reduced significantly due to the massive shallow root system characteristic of overgrazed plant communities. Soil loss may be accelerated where concentrated flows occur.

Table 8. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	773	1096	1395
Shrub/Vine	62	135	224
Forb	62	101	146
Tree	—	13	28
Total	897	1345	1793

Figure 11. Plant community growth curve (percent production by month). SD5804, Northern Rolling High Plains, warm-season dominant, cool-season sub-dominant.. Warm-season dominant, cool-season sub-dominant, uplands..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	7	18	24	25	15	7	1	0	0

State 3
Go-back, Introduced, or Invaded

The State narrative is under development.

Community 3.1
Go-back, Introduced, or Invaded Plant Community

This plant community develops under severe disturbance and/or excessive defoliation. This can result from heavy livestock or wildlife concentration (i.e. water locations, bedding or loafing grounds, feeding areas), cropping abandonment (go-back land), or prairie dog habitation. The dominant vegetation includes pioneer annual grasses and forbs and early successional biennial and perennial species. Grasses may include red threeawn, sixweeks fescue, smooth brome, annual brome, crested wheatgrass, needleandthread, prairie junegrass and western wheatgrass. The dominant forbs include curlycup gumweed, maretail, salsify, kochia, field bindweed, thistles, western ragweed, pussytoes, prostrate verbena and other early successional species. Shrubs that may be present include prairie rose, fringed sagewort and broom snakeweed. Plant species from adjacent ecological sites may become minor components of this plant community. The community also is susceptible to invasion of other non-native species due to severe soil disturbances and relatively high percent of bare ground. Many annual and perennial forbs, including non-native species, have invaded the site. This plant community is resistant to change towards the Western Wheatgrass/Green Needlegrass/Shrub Plant Community as long as soil disturbance or severe vegetation defoliation persists, thus holding back secondary plant succession. Soil erosion is potentially high in this vegetation state. Reduced surface cover, low plant density, low plant vigor, loss of root biomass, and soil compaction, all contribute to decreased water infiltration, increased runoff, and accelerated erosion rates. Significant economic inputs and time would be required to move this plant community toward a higher successional stage and a more productive plant community. Secondary succession is highly variable, depending upon availability and diversity of a viable seed bank of higher successional species within the existing plant community and neighboring plant communities. This plant community can 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 1,100 pounds/acre (air-dry weight) depending upon growing conditions.

Figure 12. 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

Transition T1
State 1 to 2

Heavy continuous grazing for extended periods will shift this plant community across a threshold to the Blue Grama/Western Wheatgrass/Sagewort Plant Community.

Transition T3
State 1 to 3

Encroachment of non-native invasive/noxious species, abandonment of cropping with continuous grazing, excessive defoliation or seeding of introduced and/or native improved varieties of forage species may lead this plant community phase over a threshold to the Go-back, Introduced, Invaded State.

Transition T3
State 1 to 3

Encroachment of non-native invasive/noxious species, abandonment of cropping with continuous grazing, excessive defoliation or seeding of introduced and/or native improved varieties of forage species may lead this plant community phase over a threshold to the Go-back, Introduced, Invaded State.

Transition T3 State 1 to 3

Encroachment of non-native invasive/noxious species, abandonment of cropping with continuous grazing, excessive defoliation or seeding of introduced and/or native improved varieties of forage species may lead this plant community phase over a threshold to the Go-back, Introduced, Invaded State.

Restoration pathway R2 State 2 to 1

Long-term prescribed grazing with adequate recovery periods following each grazing event and proper stocking over long periods of time can move this plant community toward the Western Wheatgrass/Green Needlegrass/Shrub Plant Community. It may eventually return to this plant community or associated plant community stages assuming an adequate seed/vegetative source is available.

Conservation practices

Prescribed Grazing

Transition T3 State 2 to 3

Encroachment of non-native invasive/noxious species, abandonment of cropping with continuous grazing, excessive defoliation or seeding of introduced and/or native improved varieties of forage species may lead this plant community phase over a threshold to the Go-back, Introduced, Invaded State.

Restoration pathway RS State 3 to 1

Significant economic inputs, such as range seeding, and time would be required to move this plant community toward a higher successional stage and a more productive plant community.

Additional community tables

Table 9. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	Wheatgrass			701–981	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	701–981	–
2	Mid/Tall Cool-Season Grasses			560–841	
	green needlegrass	NAVI4	<i>Nassella viridula</i>	420–560	–
	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	140–280	–
	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	140–280	–
	porcupinegrass	HESP11	<i>Hesperostipa spartea</i>	140–280	–
3	Short-Warm Season Grasses			140–280	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	140–280	–
	buffalograss	BODA2	<i>Bouteloua dactyloides</i>	0–140	–
	saltgrass	DISP	<i>Distichlis spicata</i>	0–28	–

4	Other Warm-Season Grasses			140–420	
	prairie sandreed	CALO	<i>Calamovilfa longifolia</i>	56–420	–
	big bluestem	ANGE	<i>Andropogon gerardii</i>	28–224	–
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	28–224	–
	composite dropseed	SPCOC2	<i>Sporobolus compositus</i> var. <i>compositus</i>	28–140	–
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	0–140	–
	switchgrass	PAVI2	<i>Panicum virgatum</i>	28–140	–
5	Other Native Grasses			140–280	
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	28–112	–
	plains reedgrass	CAMO	<i>Calamagrostis montanensis</i>	0–84	–
	Canada wildrye	ELCA4	<i>Elymus canadensis</i>	0–84	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	0–56	–
6	Grass-Likes			28–140	
	Grass-like (not a true grass)	2GL	<i>Grass-like (not a true grass)</i>	0–140	–
	needleleaf sedge	CADU6	<i>Carex duriuscula</i>	28–140	–
	threadleaf sedge	CAFI	<i>Carex filifolia</i>	28–140	–
Forb					
8	Forbs			140–280	
	white prairie aster	SYFA	<i>Symphotrichum falcatum</i>	28–140	–
	Maximilian sunflower	HEMA2	<i>Helianthus maximiliani</i>	28–140	–
	mint	MENTH	<i>Mentha</i>	28–140	–
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	28–140	–
	Forb, native	2FN	<i>Forb, native</i>	28–112	–
	western yarrow	ACMIO	<i>Achillea millefolium</i> var. <i>occidentalis</i>	28–56	–
	purple prairie clover	DAPU5	<i>Dalea purpurea</i>	28–56	–
	scurfpea	PSORA2	<i>Psoraleidum</i>	0–56	–
	American vetch	VIAM	<i>Vicia americana</i>	28–56	–
	goldenrod	SOLID	<i>Solidago</i>	28–56	–
	upright prairie coneflower	RACO3	<i>Ratibida columnifera</i>	0–28	–
	dotted blazing star	LIPU	<i>Liatris punctata</i>	0–28	–
	rush skeletonplant	LYJU	<i>Lygodesmia juncea</i>	0–28	–
	blacksamson echinacea	ECAN2	<i>Echinacea angustifolia</i>	0–28	–
	sanddune wallflower	ERCAC	<i>Erysimum capitatum</i> var. <i>capitatum</i>	0–28	–
	scarlet beeblossom	GACO5	<i>Gaura coccinea</i>	0–28	–
	field sagewort	ARCA12	<i>Artemisia campestris</i>	0–28	–
	wavyleaf thistle	CIUN	<i>Cirsium undulatum</i>	0–28	–
Shrub/Vine					
9	Shrubs			280–420	
	western snowberry	SYOC	<i>Symphoricarpos occidentalis</i>	28–280	–
	silver sagebrush	ARCA13	<i>Artemisia cana</i>	28–280	–
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	0–112	–
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	28–84	–

	big sagebrush	ARTR2	<i>Artemisia tridentata</i>	0–84	–
	rose	ROSA5	<i>Rosa</i>	28–84	–
	American plum	PRAM	<i>Prunus americana</i>	28–56	–
	chokecherry	PRVI	<i>Prunus virginiana</i>	28–56	–
	leadplant	AMCA6	<i>Amorpha canescens</i>	0–56	–
	silver buffaloberry	SHAR	<i>Shepherdia argentea</i>	0–28	–
Tree					
10	Trees			0–56	
	boxelder	ACNE2	<i>Acer negundo</i>	0–28	–
	green ash	FRPE	<i>Fraxinus pennsylvanica</i>	0–28	–
	plains cottonwood	PODEM	<i>Populus deltoides ssp. monilifera</i>	0–28	–
	American elm	ULAM	<i>Ulmus americana</i>	0–28	–

Table 10. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	Wheatgrass			191–381	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	191–381	–
2	Mid/Tall Cool-Season Grasses			38–191	
	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	19–152	–
	green needlegrass	NAVI4	<i>Nassella viridula</i>	19–152	–
	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	0–95	–
	porcupinegrass	HESP11	<i>Hesperostipa spartea</i>	0–76	–
3	Short-Warm Season Grasses			381–572	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	286–476	–
	buffalograss	BODA2	<i>Bouteloua dactyloides</i>	38–191	–
	saltgrass	DISP	<i>Distichlis spicata</i>	0–76	–
4	Other Warm-Season Grasses			38–191	
	prairie sandreed	CALO	<i>Calamovilfa longifolia</i>	19–152	–
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	0–95	–
	composite dropseed	SPCOC2	<i>Sporobolus compositus var. compositus</i>	0–95	–
	big bluestem	ANGE	<i>Andropogon gerardii</i>	0–57	–
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	0–38	–
	switchgrass	PAVI2	<i>Panicum virgatum</i>	0–19	–
5	Other Native Grasses			19–133	
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	19–76	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	0–38	–
	plains reedgrass	CAMO	<i>Calamagrostis montanensis</i>	0–38	–
	Canada wildrye	ELCA4	<i>Elymus canadensis</i>	0–19	–
6	Grass-Likes			38–191	
	needleleaf sedge	CADU6	<i>Carex duriuscula</i>	19–152	–
	threadleaf sedge	CAFI	<i>Carex filifolia</i>	19–152	–
	Grass-like (not a true grass)	2GI	Grass-like (not a true grass)	0–95	–

	Grass-like (not a true grass)	POA	Grass-like (not a true grass)	0-38	
7	Non-Native Grasses			38-191	
	bluegrass	POA	<i>Poa</i>	19-133	-
	cheatgrass	BRTE	<i>Bromus tectorum</i>	19-95	-
Forb					
8	Forbs			95-191	
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	19-133	-
	white prairie aster	SYFA	<i>Symphyotrichum falcatum</i>	19-95	-
	Forb, introduced	2FI	<i>Forb, introduced</i>	19-76	-
	Forb, native	2FN	<i>Forb, native</i>	19-76	-
	western yarrow	ACMIO	<i>Achillea millefolium var. occidentalis</i>	19-57	-
	field sagewort	ARCA12	<i>Artemisia campestris</i>	19-57	-
	scurfpea	PSORA2	<i>Psoralegium</i>	19-57	-
	goldenrod	SOLID	<i>Solidago</i>	19-57	-
	mint	MENTH	<i>Mentha</i>	0-38	-
	upright prairie coneflower	RACO3	<i>Ratibida columnifera</i>	19-38	-
	wavyleaf thistle	CIUN	<i>Cirsium undulatum</i>	0-38	-
	purple prairie clover	DAPU5	<i>Dalea purpurea</i>	19-38	-
	sanddune wallflower	ERCAC	<i>Erysimum capitatum var. capitatum</i>	0-38	-
	Maximilian sunflower	HEMA2	<i>Helianthus maximiliani</i>	0-38	-
	rush skeletonplant	LYJU	<i>Lygodesmia juncea</i>	0-19	-
	American vetch	VIAM	<i>Vicia americana</i>	0-19	-
Shrub/Vine					
9	Shrubs			95-191	
	silver sagebrush	ARCA13	<i>Artemisia cana</i>	19-152	-
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	19-133	-
	western snowberry	SYOC	<i>Symphoricarpos occidentalis</i>	19-133	-
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	0-95	-
	big sagebrush	ARTR2	<i>Artemisia tridentata</i>	0-57	-
	rose	ROSA5	<i>Rosa</i>	19-57	-
	American plum	PRAM	<i>Prunus americana</i>	19-38	-
	chokecherry	PRVI	<i>Prunus virginiana</i>	0-19	-
Tree					
10	Trees			0-38	
	boxelder	ACNE2	<i>Acer negundo</i>	0-19	-
	green ash	FRPE	<i>Fraxinus pennsylvanica</i>	0-19	-
	plains cottonwood	PODEM	<i>Populus deltoides ssp. monilifera</i>	0-19	-
	American elm	ULAM	<i>Ulmus americana</i>	0-19	-

Table 11. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	Wheatgrass			224-448	

	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	224–448	–
2	Mid/Tall Cool-Season Grasses			112–336	
	green needlegrass	NAVI4	<i>Nassella viridula</i>	112–336	–
	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	22–112	–
	porcupinegrass	HESP11	<i>Hesperostipa spartea</i>	0–90	–
	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	22–90	–
3	Short-Warm Season Grasses			45–179	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	22–157	–
	buffalograss	BODA2	<i>Bouteloua dactyloides</i>	0–67	–
	saltgrass	DISP	<i>Distichlis spicata</i>	0–22	–
4	Other Warm-Season Grasses			0–157	
	prairie sandreed	CALO	<i>Calamovilfa longifolia</i>	0–112	–
	composite dropseed	SPCOC2	<i>Sporobolus compositus var. compositus</i>	0–67	–
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	0–45	–
	switchgrass	PAVI2	<i>Panicum virgatum</i>	0–22	–
	big bluestem	ANGE	<i>Andropogon gerardii</i>	0–22	–
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	0–22	–
5	Other Native Grasses			22–112	
	Canada wildrye	ELCA4	<i>Elymus canadensis</i>	0–90	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	22–67	–
	plains reedgrass	CAMO	<i>Calamagrostis montanensis</i>	0–67	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	0–22	–
6	Grass-Likes			45–179	
	needleleaf sedge	CADU6	<i>Carex duriuscula</i>	22–157	–
	threadleaf sedge	CAFI	<i>Carex filifolia</i>	22–157	–
	Grass-like (not a true grass)	2GL	<i>Grass-like (not a true grass)</i>	0–112	–
7	Non-Native Grasses			336–673	
	bluegrass	POA	<i>Poa</i>	336–673	–
	cheatgrass	BRTE	<i>Bromus tectorum</i>	45–224	–
Forb					
8	Forbs			45–179	
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	22–135	–
	Forb, introduced	2FI	<i>Forb, introduced</i>	22–90	–
	goldenrod	SOLID	<i>Solidago</i>	22–90	–
	white prairie aster	SYFA	<i>Symphotrichum falcatum</i>	22–90	–
	scurfpea	PSORA2	<i>Psoralegium</i>	0–67	–
	Forb, native	2FN	<i>Forb, native</i>	22–67	–
	western yarrow	ACMIO	<i>Achillea millefolium var. occidentalis</i>	22–67	–
	field sagewort	ARCA12	<i>Artemisia campestris</i>	0–45	–
	wavyleaf thistle	CIUN	<i>Cirsium undulatum</i>	0–22	–
	purple prairie clover	DAPU5	<i>Dalea purpurea</i>	0–22	–
	sanddune wallflower	ERCAC	<i>Erysimum capitatum var. capitatum</i>	0–22	–

	Maximilian sunflower	HEMA2	<i>Helianthus maximiliani</i>	0–22	–
	rush skeletonplant	LYJU	<i>Lygodesmia juncea</i>	0–22	–
	mint	MENTH	<i>Mentha</i>	0–22	–
	upright prairie coneflower	RACO3	<i>Ratibida columnifera</i>	0–22	–
Shrub/Vine					
9	Shrubs			336–560	
	western snowberry	SYOC	<i>Symphoricarpos occidentalis</i>	45–336	–
	silver sagebrush	ARCA13	<i>Artemisia cana</i>	22–179	–
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	0–157	–
	American plum	PRAM	<i>Prunus americana</i>	22–157	–
	chokecherry	PRVI	<i>Prunus virginiana</i>	22–112	–
	rose	ROSA5	<i>Rosa</i>	22–112	–
	big sagebrush	ARTR2	<i>Artemisia tridentata</i>	0–90	–
	silver buffaloberry	SHAR	<i>Shepherdia argentea</i>	0–67	–
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	22–67	–
	leadplant	AMCA6	<i>Amorpha canescens</i>	0–45	–
Tree					
10	Trees			0–45	
	boxelder	ACNE2	<i>Acer negundo</i>	0–22	–
	green ash	FRPE	<i>Fraxinus pennsylvanica</i>	0–22	–
	plains cottonwood	PODEM	<i>Populus deltoides ssp. monilifera</i>	0–22	–
	American elm	ULAM	<i>Ulmus americana</i>	0–22	–

Table 12. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	Wheatgrass			67–202	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	67–202	–
2	Mid/Tall Cool-Season Grasses			0–67	
	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	0–67	–
	green needlegrass	NAVI4	<i>Nassella viridula</i>	0–67	–
3	Short-Warm Season Grasses			336–605	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	336–538	–
	buffalograss	BODA2	<i>Bouteloua dactyloides</i>	27–135	–
	saltgrass	DISP	<i>Distichlis spicata</i>	0–67	–
4	Other Warm-Season Grasses			0–40	
	composite dropseed	SPCOC2	<i>Sporobolus compositus var. compositus</i>	0–40	–
5	Other Native Grasses			13–54	
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	13–40	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	13–27	–
6	Grass-Likes			67–202	
	needleleaf sedge	CADU6	<i>Carex duriuscula</i>	27–135	–

	threadleaf sedge	CAFI	<i>Carex filifolia</i>	27–135	–
	Grass-like (not a true grass)	2GL	<i>Grass-like (not a true grass)</i>	0–67	–
7	Non-Native Grasses			13–67	
	cheatgrass	BRTE	<i>Bromus tectorum</i>	13–67	–
	bluegrass	POA	<i>Poa</i>	0–67	–
Forb					
8	Forbs			67–135	
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	13–108	–
	field sagewort	ARCA12	<i>Artemisia campestris</i>	13–67	–
	Forb, native	2FN	<i>Forb, native</i>	13–54	–
	Forb, introduced	2FI	<i>Forb, introduced</i>	13–40	–
	scurfpea	PSORA2	<i>Psoralidium</i>	0–40	–
	white prairie aster	SYFA	<i>Symphotrichum falcatum</i>	13–40	–
	goldenrod	SOLID	<i>Solidago</i>	13–27	–
	western yarrow	ACMIO	<i>Achillea millefolium var. occidentalis</i>	13–27	–
	wavyleaf thistle	CIUN	<i>Cirsium undulatum</i>	0–13	–
	rush skeletonplant	LYJU	<i>Lygodesmia juncea</i>	0–13	–
Shrub/Vine					
9	Shrubs			67–202	
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	27–135	–
	silver sagebrush	ARCA13	<i>Artemisia cana</i>	13–67	–
	western snowberry	SYOC	<i>Symphoricarpos occidentalis</i>	13–67	–
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	0–40	–
	big sagebrush	ARTR2	<i>Artemisia tridentata</i>	0–27	–
	rose	ROSA5	<i>Rosa</i>	0–27	–
	American plum	PRAM	<i>Prunus americana</i>	0–13	–
Tree					
10	Trees			0–27	
	boxelder	ACNE2	<i>Acer negundo</i>	0–13	–
	green ash	FRPE	<i>Fraxinus pennsylvanica</i>	0–13	–
	plains cottonwood	PODEM	<i>Populus deltoides ssp. monillifera</i>	0–13	–
	American elm	ULAM	<i>Ulmus americana</i>	0–13	–

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 Loamy Terrace 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.

This ES can support an abandoned floodplain plant community and may be associated with an adjacent riparian plant community. The abandoned floodplain plant community may be composed of mature cottonwood and various age classes of elm, green ash, and boxelder; with a shrub component of chokecherry, wild plum, western snowberry, silver sagebrush, wild rose, etc. The presence or absence of this tree/shrub component is an important factor influencing wildlife species composition.

Rare flooding events deposit silt on the site which may allow the potential sprouting of plains cottonwood. However, due to the droughtiness of this site, cottonwood establishment does not occur. This site is subject to invasion of grass species such as annual brome grasses and Kentucky bluegrass. Woody species such as Eastern red cedar, Rocky Mountain juniper, and Russian-olive may invade this site.

The Loamy Terrace ES has been subject to conversion to cropland or hayland, some sites being irrigated. Where intact, the site provides important habitat for grassland, woodland and shrub 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 herptiles and raccoons. These sites also provide forage sites for greater sage-grouse broods. Invasive grass or woody species have impacted the biological integrity of the site, particularly for ground nesting birds.

Western Wheatgrass/Green Needlegrass/Shrub: The predominance of grasses plus high diversity of forbs and shrubs in this community favors grazers and mixed-feeders, such as white-tailed deer. Plant communities associated with woody habitat provide habitat for songbirds such as brown thrasher, redheaded woodpecker, warbling vireo, yellow warbler, gray catbird, Say's phoebe, loggerhead shrike, Lazuli bunting, yellow breasted chat, and black-headed grosbeak; and raptors such as red-tailed hawk, Swainson's hawk, American kestrel, and great-horned owl. Insects, such as pollinators, play a large role in maintaining the forb community and provide a forage base for birds and other species. Diverse prey populations are available for grassland raptors and mammalian predators, especially bobcat.

The diversity of grasses, forbs, and shrubs provide high 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 high stature of this plant community provides suitable thermal, protective, and escape cover for small and large mammals. This plant community provides habitat for tiger salamander, various frog, and toad species, and bull and garter snakes. Introduced bird species such as European starling, ring-necked pheasant, and gray partridge will use this site.

Western Wheatgrass/Blue Grama: Resulting from heavy continuous season-long grazing without adequate recovery periods between grazing events or increased fire frequency, western wheatgrass and blue grama will dominate. Shrub diversity and density has decreased. The tree component is aging and the tree diversity and density remains largely unchanged. Livestock damage to trees is often noticeable. The loss of shrub component results in reduced habitat for brown thrasher, yellow warbler, gray catbird, loggerhead shrikes, Lazuli bunting, and yellow breasted chat. The tall tree component continues to provide habitat for red-tailed hawk, American kestrel, redheaded woodpecker, warbling vireo, black-headed grosbeak, and Say's phoebe. This plant community provides habitat for tiger salamander, leopard frog, and bull and garter snakes.

Kentucky Bluegrass/Shrub: Long periods of nonuse and loss of fire allows the Kentucky bluegrass and shrub component to dominate the shorter vegetative stratum. Increased litter cools the soil surface allowing for shrubs such as western snowberry chokecherry, silver Buffaloberry, and American plum to establish. The taller vegetative stratum will become dominated by green ash, boxelder, and Rocky Mountain juniper. Wildlife diversity is reduced due to changes in the vegetative community. Prominent species will include meadow vole, common yellowthroat, savannah sparrow, and northern harrier.

Ecological processes on this site have been impacted by increased litter interfering with nutrient and water cycles decreasing forb and graminoid diversity.

Blue Grama/Western Wheatgrass/Sagewort: Resulting from long-term, heavy, continuous season-long grazing without adequate recovery periods between grazing events sagewort will infiltrate the blue grama and western wheatgrass community. Taller shrubs such as chokecherry and American plum are greatly decreased, while shorter shrubs such as western snowberry and silver sagebrush are increased. Tree vigor and canopy are reduced through various stressors. The loss of shrub component results in reduced habitat for brown thrasher, yellow warbler, gray catbird, loggerhead shrikes, Lazuli bunting, and yellow breasted chat. Loss of tree vigor and canopy reduces habitat quality for warbling vireo and black-headed grosbeak. Increased soil temperature reduces habitat quality for most amphibians.

Ecological processes on this site have been impacted by decreased litter interfering with nutrient and water cycles decreasing forb and graminoid diversity. Runoff increases due to bare ground and decreased litter, resulting in sediment loading and warmer water to adjacent streams.

Go Back, Introduced, and/or Invaded States

This group includes separate vegetation states that are highly variable in nature. They are derived through distinct management scenarios. These plant communities have been or are highly susceptible to invasion of annual brome grasses, bluegrasses, crested wheatgrass, and other non-native species.

Since secondary succession is highly variable plant and wildlife species will vary. This plant community provides habitat for generalist or early successional species. In addition, these communities may contain prairie dog towns. Prairie dog towns are sites of high plant and wildlife diversity.

The Go-back state can be reached whenever severe mechanical disturbance (i.e., abandoned farmland) is eliminated. Early successional plant communities include annual and perennial weedy type species first to occupy the site. These sites provide diverse foraging, reproductive and escape cover favoring multiple edge species. This pioneer plant community provides abundant opportunity for insect, bird, and small mammal foraging due to abundant flowers and seed sources. The Introduced state provides increased forage and therefore a potential for increased herbivore populations such as deer, pronghorn, and various small mammals. These sites provide diverse foraging, reproductive, and escape cover favoring multiple edge species.

The Invaded state includes areas that have been invaded and are dominated by species such as smooth brome, Kentucky bluegrass, crested wheatgrass, nonnative thistles, field bindweed, knapweeds, leafy spurge, hoary cress, and other introduced species. These sites greatly reduce foraging, reproductive, and escape cover for grassland nesting bird 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 provide better management flexibility, less plant diversity, and a potential increase in soil erosion. The Go-back, or Invaded 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 B, with localized areas in 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; Chuck Berdan, Biologist (BIO), Bureau of Land Management (BLM); Stan Boltz, RMS, NRCS; Dave Dewald, Wildlife BIO, NRCS; Jody Forman, RMS, NRCS; Dennis Froemke, RMS, NRCS; Tom Juntti, BIO, United States Forest Service (USFS); Cheryl Nielsen, RMS, NRCS; Jeff Printz, RMS, NRCS; Mike Stirling, RMS, NRCS; Dan Svingen, BIO, USFS; Darrell Vanderbusch, Soil Scientist, NRCS; Cindy Zachmeier, BIO, NRCS; and Tim Zachmeier, BIO, BLM.

There is 1 SCS-RANGE-417 collected in 1982 in Harding County, South Dakota.

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Contributors

Stan Boltz
Travis Patient

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
Contact for lead author	stanley.boltz@sd.usda.gov, 605-352-1236
Date	05/06/2010
Approved by	Stan Boltz
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

2. **Presence of water flow patterns:** None, or barely visible and discontinuous.

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

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.

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

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

7. **Amount of litter movement (describe size and distance expected to travel):** Litter should fall in place. Slight amount of movement of smallest size class litter is possible, but not normal.

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.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** A-horizon should be 5 to 15 inches thick with mollic (dark) colors when moist. Structure typically is medium to fine granular 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.
-
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.
-
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: Mid/tall warm-season grasses = shrubs >
- Other: Short warm-season grasses = Forbs > 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 1,700-3,300 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, annual bromes
-
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.
-

