USDA Natural Resources
Conservation Service

Ecological site R058DY019SD
Closed Depression

Accessed: 04/30/2024

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.

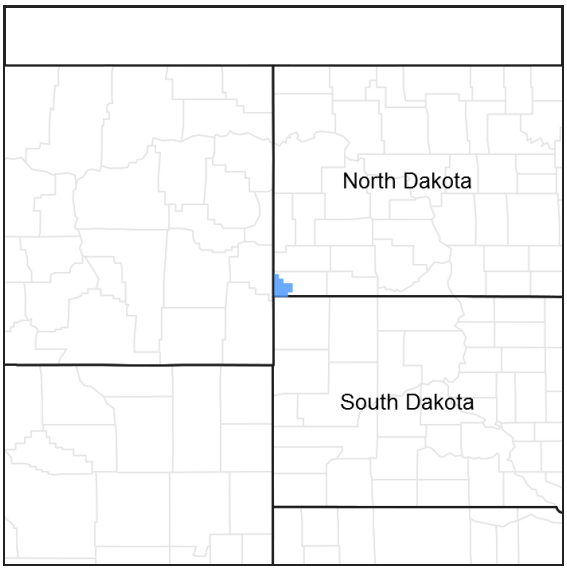


Figure 1. Mapped extent

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

R058DY010SD	**Loamy**
R058DY011SD	**Clayey**

Similar sites

R058DY011SD	**Clayey** Clayey [less grass-like species; less production]
R058DY010SD	**Loamy** Saline Lowland [less western wheatgrass; less forbs]

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified

Herbaceous	(1) *Pascopyrum smithii* (2) *Hordeum jubatum*

Physiographic features

This site occurs on concave to nearly level depressions.

Table 2. Representative physiographic features

Landforms	(1) Depression
Flooding frequency	None
Ponding duration	Brief (2 to 7 days) to long (7 to 30 days)
Ponding frequency	Rare to occasional
Elevation	701–1,219 m
Slope	0–2%
Ponding depth	0–46 cm
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 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)	406 mm

Influencing water features

No significant water features influence this site.

Soil features

The soils in this site are poorly drained and formed in clayey alluvium derived from sedimentary rock. The silty clay to clay surface layer is two to three inches thick. The soils have a very slow infiltration rate. The soils crack when dry and heavy traffic can cause surface compaction when wet. 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

Surface texture	(1) Silty clay (2) Clay
Family particle size	(1) Clayey
Drainage class	Poorly drained
Permeability class	Very slow
Soil depth	203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	15.24 cm
Calcium carbonate equivalent (0-101.6cm)	0–15%
Electrical conductivity (0-101.6cm)	0–16 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–4
Soil reaction (1:1 water) (0-101.6cm)	5.6–9
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.

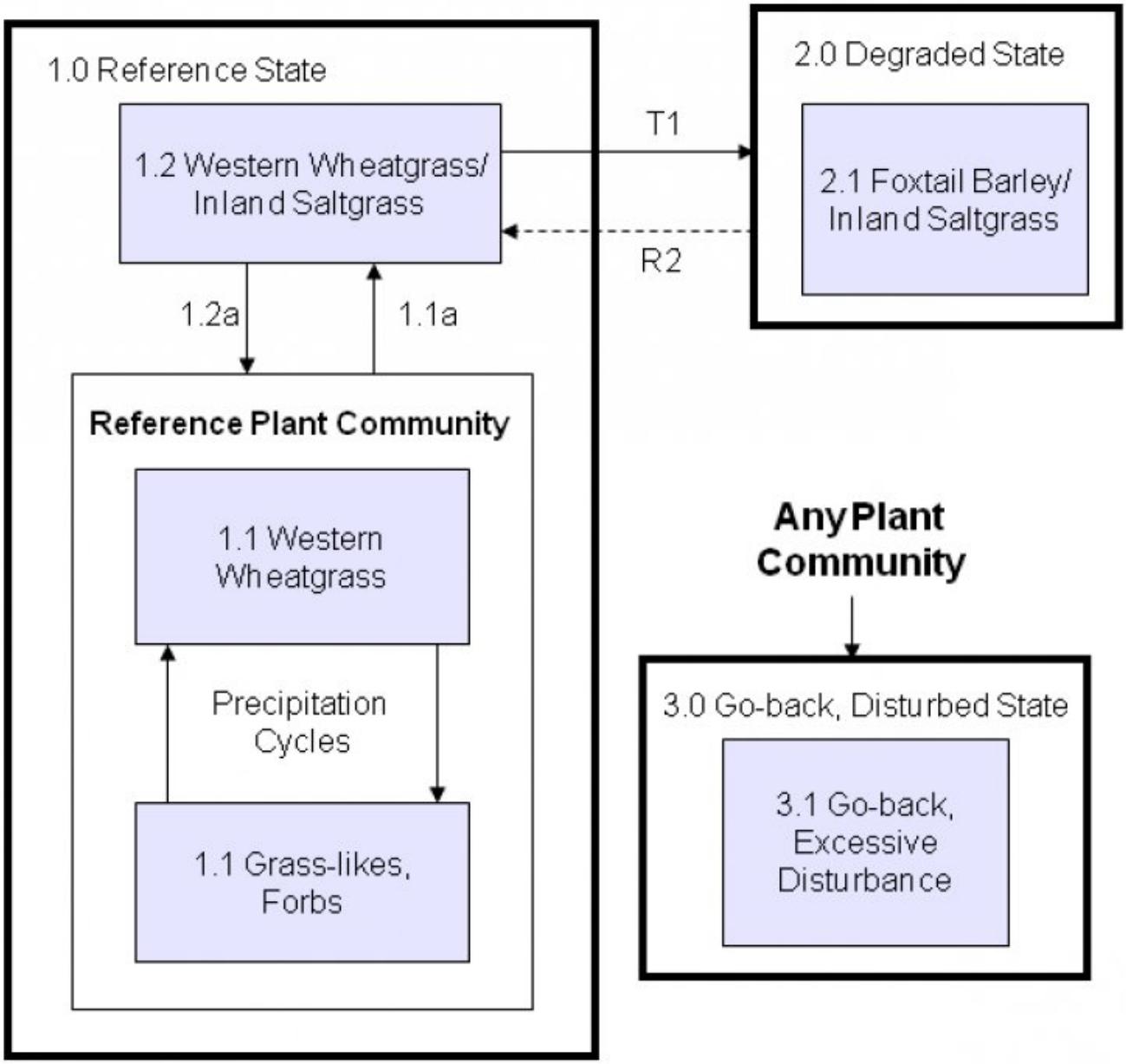
This site is very sensitive to precipitation fluctuations from year to year. With above average precipitation, the site becomes very wet, leading to a much different plant community than what would be present with average to below average precipitation. In dry years, plant density becomes very low. The two plant communities influenced strongly by precipitation alone (Western Wheatgrass; and Grass-likes, Forbs) make up the natural fluctuation of what could be considered the Historic Climax Plant Community.

The plant community upon which interpretations are primarily based is the Reference 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
Reference Plant Community

The plant community upon which interpretations are primarily based is the Reference Plant Community. It is actually made up of two somewhat distinct plant communities, which are described below. The Reference Plant Community can be found on areas that are properly managed with grazing and/or prescribed burning, and on areas receiving occasional short periods of deferment. The potential vegetation is about 40 to 90 percent grass and grass-like species, and 5 to 60 percent forbs. The dominant species fluctuate significantly depending on precipitation cycles. Significant grasses and grass-likes present include western wheatgrass, Nuttall's alkaligrass, slender wheatgrass, inland saltgrass, bluegrass, ticklegrass, common spikerush, needle Spikerush, and other rushes and sedges. Significant forbs include smartweed, American licorice, buttercup, evening-primrose, silverleaf cinquefoil, slender cinquefoil, and western dock. 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 at this sites potential. When present, plant litter is properly distributed with very little movement offsite. Natural plant mortality can be significant following periods of below average precipitation. The diversity in plant species allows for both the fluctuation of ponding as well as the occurrence of randomly occurring drought.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1457	1664	2466
Forb	112	801	2018
Total	**1569**	**2465**	**4484**

Figure 5. Plant community growth curve (percent production by month). SD5808, Northern Rolling High Plains, lowland cool-season/warm-season codominant. Cool-season, Warm-season codominant, Lowland.

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

Community 1.2
Western Wheatgrass/Inland Saltgrass

This plant community is the result of heavy continuous grazing, and in some cases, repeated seasonal grazing such as spring grazing every year. Lack of litter and short plant heights result in higher soil temperatures, poor water infiltration rates, high evaporation, and increased percolation of the high water table, which increases salt concentrations on the surface. This gives inland saltgrass and other salt tolerant species a competitive advantage over less tolerant species. Western wheatgrass and inland saltgrass drastically increase and are the dominant species with the balance being a few species of cool-season grasses, and grass-likes including Nuttall's alkaligrass, plains bluegrass, ticklegrass, common spikerush, needle spikerush, and other sedges and rushes. Early cool-season grasses including foxtail barley and bluegrass begin to increase and/or invade. Forbs that will invade are curly dock, sweetclover, and cocklebur while lambsquarters, pepperweed, povertyweed, and western dock will increase. This plant community can occur throughout the pasture, on spot grazed areas, and around water sources where season-long grazing patterns occur. This plant community is relatively stable and well adapted to increased salinity. Plant vigor, litter, frequency, and production have decreased. The biological integrity, water, and nutrient cycles of this plant community are becoming impaired. This plant community is less productive than the Reference Plant Community.

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1250	1765	2219
Forb	95	252	471
Total	**1345**	**2017**	**2690**

Figure 7. Plant community growth curve (percent production by month).

SD5808, Northern Rolling High Plains, lowland cool-season/warm-season codominant. Cool-season, Warm-season codominant, Lowland.

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

Pathway 1.1a
Community 1.1 to 1.2

Heavy, continuous grazing will convert the plant community to the Western Wheatgrass/Inland Saltgrass Plant Community.

Pathway 1.2a
Community 1.2 to 1.1

Prescribed grazing that includes changing season of use and allowing adequate recovery periods between grazing events will lead this plant community back to the Reference Plant Community.

Conservation practices

Prescribed Grazing

State 2
Degraded

The State narrative is under development.

Community 2.1
Foxtail Barley/Inland Saltgrass

This plant community developed with heavy continuous grazing where adequate recovery periods between grazing events were not allowed. Patches of inland saltgrass sod are typical and foxtail barley and bluegrass is well distributed throughout the community. Nuttall's alkaligrass and western wheatgrass have been greatly reduced in production and vigor, and may persist in remnant amounts. This plant community is resistant to change due to the grazing tolerance of inland saltgrass and increased surface salts. A significant amount of production and diversity has been lost when compared to the Reference Plant Community. Loss of key cool season grasses and increased bare ground have negatively impacted energy flow and nutrient cycling. Water infiltration is reduced significantly due to the massive shallow root system "root pan," characteristic of inland saltgrass, and increased bare ground. It will take a long time to bring this plant community back to the Reference Plant Community with management alone. Renovation (mechanical and/or chemical inputs) is not recommended due to high salt content of the soil and saltgrass persistence.

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	521	785	1031
Forb	39	112	202
Total	**560**	**897**	**1233**

Figure 9. 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

State 3
Go-back, Disturbed

The State narrative is under development.

Community 3.1
Go-back, Excessive Disturbance

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) or cropping abandonment (go-back land). 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.

Transition T1
State 1 to 2

Heavy continuous grazing without adequate recovery opportunity between grazing events will move this plant community across an ecological threshold to the Foxtail Barley/Inland Saltgrass Plant Community.

Transition T3
State 1 to 3

Encroachment of non-native invasive/noxious species, abandonment of cropping with continuous grazing, or excessive defoliation may lead this plant community phase over a threshold to the Go-back, Excessive Disturbance.

Transition T3
State 1 to 3

Encroachment of non-native invasive/noxious species, abandonment of cropping with continuous grazing, or excessive defoliation may lead this plant community phase over a threshold to the Go-back, Excessive Disturbance.

Restoration pathway R2
State 2 to 1

Under long-term prescribed grazing, including adequate recovery periods, this plant community will move through the successional stages, and may eventually lead to the Western Wheatgrass/Inland Saltgrass Plant Community. This process will take a long period of time (25+ years).

Conservation practices

Prescribed Grazing

Transition T3
State 2 to 3

Encroachment of non-native invasive/noxious species, abandonment of cropping with continuous grazing, or excessive defoliation may lead this plant community phase over a threshold to the Go-back, Excessive Disturbance.

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Rhizomatous Wheatgrasses**			370–1480	
	western wheatgrass	PASM	*Pascopyrum smithii*	123–1480	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	0–740	–
2	**Other Native Grasses**			123–616	
	Nuttall's alkaligrass	PUNU2	*Puccinellia nuttalliana*	25–493	–
	foxtail barley	HOJU	*Hordeum jubatum*	0–370	–
	scratchgrass	MUAS	*Muhlenbergia asperifolia*	25–247	–
	saltgrass	DISP	*Distichlis spicata*	25–247	–
	fowl bluegrass	POPA2	*Poa palustris*	25–247	–
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	0–247	–
	plains bluegrass	POAR3	*Poa arida*	0–197	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	0–123	–
	rough bentgrass	AGSC5	*Agrostis scabra*	0–123	–
	American sloughgrass	BESY	*Beckmannia syzigachne*	0–123	–
3	**Grass-Likes**			123–740	
	needle spikerush	ELAC	*Eleocharis acicularis*	123–616	–
	common spikerush	ELPA3	*Eleocharis palustris*	123–616	–
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	0–370	–
	sedge	CAREX	*Carex*	123–370	–
	rush	JUNCU	*Juncus*	25–247	–
Forb					
5	**Forbs**			123–1480	
	knotweed	POLYG4	*Polygonum*	0–493	–
	Forb, native	2FN	*Forb, native*	0–493	–
	lambsquarters	CHAL7	*Chenopodium album*	0–493	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	0–370	–
	evening primrose	OENOT	*Oenothera*	0–370	–
	buttercup	RANUN	*Ranunculus*	0–370	–
	western dock	RUAQ	*Rumex aquaticus*	0–370	–
	Pursh seepweed	SUCA2	*Suaeda calceoliformis*	0–370	–
	wild mint	MEAR4	*Mentha arvensis*	0–370	–
	prairie ironweed	VEFA2	*Vernonia fasciculata*	0–247	–
	redwool plantain	PLER	*Plantago eriopoda*	0–247	–
	silver cinquefoil	POAR8	*Potentilla argentea*	0–247	–
	povertyweed	IVAX	*Iva axillaris*	0–247	–
	pepperweed	LEPID	*Lepidium*	0–123	–
	slender cinquefoil	POGRF2	*Potentilla gracilis var. fastigiata*	0–123	–
	mountain deathcamas	ZIEL2	*Zigadenus elegans*	0–123	–
	bluebells	MERTE	*Mertensia*	0–123	–

Table 9. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Shrub/Vine					
1	**Rhizomatous Wheatgrasses**			807–1211	
	western wheatgrass	PASM	*Pascopyrum smithii*	807–1211	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	202–605	–
Grass/Grasslike					
2	**Other Native Grasses**			404–1009	
	saltgrass	DISP	*Distichlis spicata*	404–807	–
	foxtail barley	HOJU	*Hordeum jubatum*	61–202	–
	Nuttall's alkaligrass	PUNU2	*Puccinellia nuttalliana*	101–202	–
	fowl bluegrass	POPA2	*Poa palustris*	20–121	–
	scratchgrass	MUAS	*Muhlenbergia asperifolia*	0–101	–
	plains bluegrass	POAR3	*Poa arida*	0–101	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	0–101	–
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	0–101	–
	rough bentgrass	AGSC5	*Agrostis scabra*	0–101	–
	American sloughgrass	BESY	*Beckmannia syzigachne*	0–101	–
3	**Grass-Likes**			101–404	
	sedge	CAREX	*Carex*	101–303	–
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	0–202	–
	common spikerush	ELPA3	*Eleocharis palustris*	40–202	–
	rush	JUNCU	*Juncus*	40–202	–
	needle spikerush	ELAC	*Eleocharis acicularis*	0–101	–
4	**Non-Native Grasses**			0–101	
	cheatgrass	BRTE	*Bromus tectorum*	0–101	–
	bluegrass	POA	*Poa*	0–101	–
Forb					
5	**Forbs**			101–404	
	sweetclover	MELIL	*Melilotus*	0–404	–
	western dock	RUAQ	*Rumex aquaticus*	0–303	–
	povertyweed	IVAX	*Iva axillaris*	0–202	–
	Forb, native	2FN	*Forb, native*	0–202	–
	lambsquarters	CHAL7	*Chenopodium album*	0–202	–
	Pursh seepweed	SUCA2	*Suaeda calceoliformis*	0–202	–
	cocklebur	XANTH2	*Xanthium*	0–202	–
	curly dock	RUCR	*Rumex crispus*	0–161	–
	knotweed	POLYG4	*Polygonum*	0–101	–
	buttercup	RANUN	*Ranunculus*	0–101	–
	Forb, introduced	2FI	*Forb, introduced*	0–101	–
	redwool plantain	PLER	*Plantago eriopoda*	0–101	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	0–101	–

	curlycup gumweed	GRSQ	*Grindelia squarrosa*	0–101	–
	pepperweed	LEPID	*Lepidium*	0–101	–
	wild mint	MEAR4	*Mentha arvensis*	0–101	–
	prairie ironweed	VEFA2	*Vernonia fasciculata*	0–101	–
	silver cinquefoil	POAR8	*Potentilla argentea*	0–61	–
	slender cinquefoil	POGRF2	*Potentilla gracilis var. fastigiata*	0–61	–
	evening primrose	OENOT	*Oenothera*	0–61	–
	bluebells	MERTE	*Mertensia*	0–40	–
	mountain deathcamas	ZIEL2	*Zigadenus elegans*	0–40	–

Table 10. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Rhizomatous Wheatgrasses**			45–135	
	western wheatgrass	PASM	*Pascopyrum smithii*	45–135	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	0–90	–
2	**Other Native Grasses**			359–717	
	foxtail barley	HOJU	*Hordeum jubatum*	269–538	–
	saltgrass	DISP	*Distichlis spicata*	90–269	–
	Nuttall's alkaligrass	PUNU2	*Puccinellia nuttalliana*	45–90	–
	scratchgrass	MUAS	*Muhlenbergia asperifolia*	9–90	–
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	0–45	–
	rough bentgrass	AGSC5	*Agrostis scabra*	0–45	–
	American sloughgrass	BESY	*Beckmannia syzigachne*	0–45	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	0–45	–
	fowl bluegrass	POPA2	*Poa palustris*	0–36	–
3	**Grass-Likes**			18–179	
	sedge	CAREX	*Carex*	45–135	–
	needle spikerush	ELAC	*Eleocharis acicularis*	0–90	–
	common spikerush	ELPA3	*Eleocharis palustris*	18–90	–
	rush	JUNCU	*Juncus*	18–90	–
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	0–90	–
4	**Non-Native Grasses**			27–135	
	cheatgrass	BRTE	*Bromus tectorum*	0–90	–
	bluegrass	POA	*Poa*	18–90	–
Forb					
5	**Forbs**			45–179	
	western dock	RUAQ	*Rumex aquaticus*	0–135	–
	Pursh seepweed	SUCA2	*Suaeda calceoliformis*	0–90	–
	cocklebur	XANTH2	*Xanthium*	0–90	–
	povertyweed	IVAX	*Iva axillaris*	9–90	–
	knotweed	POLYG4	*Polygonum*	0–90	–

	Forb, introduced	2FI	*Forb, introduced*	0–90	–
	Forb, native	2FN	*Forb, native*	0–90	–
	lambsquarters	CHAL7	*Chenopodium album*	0–90	–
	sweetclover	MELIL	*Melilotus*	0–90	–
	evening primrose	OENOT	*Oenothera*	0–45	–
	redwool plantain	PLER	*Plantago eriopoda*	0–45	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	0–45	–
	curlycup gumweed	GRSQ	*Grindelia squarrosa*	0–45	–
	buttercup	RANUN	*Ranunculus*	0–45	–
	pepperweed	LEPID	*Lepidium*	0–45	–
	prairie ironweed	VEFA2	*Vernonia fasciculata*	0–45	–
	silver cinquefoil	POAR8	*Potentilla argentea*	0–27	–
	slender cinquefoil	POGRF2	*Potentilla gracilis var. fastigiata*	0–27	–
	mountain deathcamas	ZIEL2	*Zigadenus elegans*	0–18	–

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 Closed Depression Ecological Site (ES) provides upland and wetland complexes cover with an associated forb 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, Loamy Terrace, Sandy Terrace, and Clayey ESs.

The Closed Depression ES has remained relatively intact but may be subject to haying under drier conditions. This site has sufficient hydrology to support hydrophytic vegetation and wildlife species associated with ponded and saturated soil conditions. This site receives surface water from adjacent upland sites, snow melt, and rainfall events. The site provides important wetland habitat for birds, small rodents, bats, mammalian predators, reptiles, and insects. These sites also provide forage sites for greater sage-grouse broods.

Western Wheatgrass and Grass-likes, Forbs (Reference): This site fluctuates between two separate climax plant communities depending upon the precipitation cycle. During drier cycles, the site is dominated by western

wheatgrass. During wetter cycles the site is dominated by grass-like plants (e.g., sedges and rushes) and forbs.

During drier cycles, the western wheatgrass dominated site provides upland wildlife habitat. Mixed-grass species and/or species associated with the adjacent ESs will utilize this site.

During wetter cycles, the sedge, rush, and forb site provides wetland wildlife habitat.

The predominance of hydrophytic vegetation, including a high diversity of sedges and other grass-like species, favors shorebirds (e.g., plovers, sandpipers, and snipe) and wetland associated songbirds. This plant community provides habitat for salamanders, various frog and toad species, and various snake species. Invertebrates are an important component of the food web. Raptors such as northern harrier, short-eared owl, Swainson's hawk, and American kestrel, will use this site. Prey populations are limited to small mammals such as water shrew and meadow vole and invertebrates. When associated with ESs dominated by big sagebrush, greater sage-grouse will use the site for brood rearing/foraging habitat.

Western Wheatgrass/Inland Saltgrass and Foxtail Barley/Inland Saltgrass:
Resulting from heavy continuous grazing, this site becomes dominated by shorter more saline tolerant species. The predominance of saline tolerant hydrophytic vegetation does not favor any particular wildlife group. However, the site may receive limited shorebird use. This plant community provides habitat for limited invertebrate populations. Herptile use is either extremely limited or nonexistent. Raptors such as northern harrier, short-eared owl, Swainson's hawk, and American kestrel will use this site. Prey populations are limited to small mammals such as water shrew and meadow vole and invertebrates.

Go-back: This site 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.

Excessive Disturbance: This plant community develops under severe disturbance and/or excessive defoliation. This can result from heavy livestock concentration or cropping. The dominant vegetation includes pioneer 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 foxtail barley, quackgrass, and other nonnative species due to severe soil disturbances and relatively high percent of bare ground. Wildlife use improves with lower levels of foxtail barley and quackgrass invasion. Significant concentrations of these two species will significantly limit wildlife use. Wildlife use may remain relatively unchanged if the annual/pioneer plants are not invasive because of the relative high seed and flower production.

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 Foxtail Barley/Inland Saltgrass 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 D. 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.

Other references

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Contributors

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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.

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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.

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2. **Presence of water flow patterns:** None.

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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 10 percent is typical during normal precipitation cycles. Considerably higher amounts can occasionally occur after flooding/drying cycles, up to 50%.

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

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

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7. **Amount of litter movement (describe size and distance expected to travel):** Litter falls in place. Little movement occurs.

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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 can range widely. Readings of 2-3 are not uncommon, but can range up to 5-6. Surface organic matter adheres to the soil surface, but due to the inherent content of soluble salts in these soils, flocculation can readily occur. Soil surface fragments can dissolve quickly 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 2 to 6 inches thick with dark gray colors when moist. Structure typically is thin platy to subangular blocky in the A-horizon.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Infiltration is greatly reduced on this site due to the nature of the soils. Plant

composition changes have little effect. Default rating of none to slight is acceptable.

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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):** A-horizon naturally has some platy structure. Compaction layers, if formed by management, do not typically persist. Compaction will be difficult to determine. Evidence of compaction can be confirmed by signs of recent concentration of livestock.

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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:

    Sub-dominant:

    Other:

    Additional: Functional/structural groups can be highly variable due to periodic flooding and drying cycles. Cool-season rhizomatous grasses can dominate during normal precipitation periods. Forbs may dominate following wet periods, and rushes, sedges, and spikerushes can be sub-dominant during and after wet periods.

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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.

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

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Production ranges from 1,400-4,000 lbs./acre (air-dry weight). Reference value production is 2,200 lbs./acre (air-dry weight).

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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

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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.
