

Ecological site R058DY031SD Sandy Terrace

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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

R058DY009SD	Sandy Sandy [more 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) Pascopyrum smithii (2) Calamovilfa longifolia

Physiographic features

This site occurs on nearly level stream terraces.

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

Table 2. Representative physiographic features

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 area.

Soil features

The soils on this site range from fine sandy loam to loamy fine sand surface textures and have slopes of one to four percent. These soils are well drained and formed in alluvium derived from sandstone. The surface layer is five to nine inches thick. The texture of the subsurface layers range from loamy fine sand to fine sandy loam. 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.

Surface texture	(1) Fine sandy loam (2) Loamy fine sand
Family particle size	(1) Sandy
Drainage class	Well drained
Permeability class	Moderate to moderately rapid
Soil depth	203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	10.16 cm
Calcium carbonate equivalent (0-101.6cm)	0–15%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	5.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Table 4. Representative soil features

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 Prairie Sandreed/Western Wheatgrass/Shrubs 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 bromegrass 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 Prairie Sandreed/Western Wheatgrass/Shrubs 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 Prairie Sandreed/Western Wheatgrass/Shrubs The plant community upon which interpretations are primarily based is the Prairie Sandreed/Western Wheatgrass/Shrubs 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 90 percent grasses and grass-like plants, 2 to 8 percent forbs, 5 to 15 percent shrubs, and 0 to 2 percent trees. Major grasses include prairie sandreed, western wheatgrass, and needleandthread. 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. Run-off 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	1732	2354	2886
Shrub/Vine	123	280	499
Forb	50	140	252
Tree	-	28	62
Total	1905	2802	3699

Figure 5. 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	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	10	20	28	21	10	5	3	0	0

Community 1.2 Western Wheatgrass/Blue Grama Plant Community

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. Prairie sandreed 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 Prairie Sandreed/Western Wheatgrass/Shrubs 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	1222	1648	1933
Shrub/Vine	90	143	213
Forb	34	95	168
Tree	-	19	39
Total	1346	1905	2353

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

SD5803, Northern Rolling High Plains, cool-season/warm-season codominant.. 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 Plant Community

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 Prairie Sandreed/Western Wheatgrass/Shrubs 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	1379	1715	1967
Shrub/Vine	196	336	532
Forb	106	168	252
Tree	-	22	50
Total	1681	2241	2801

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	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	4	12	25	36	10	5	4	4	0	0

Pathway 1.1a Community 1.1 to 1.2

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

Pathway 1.1b 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/Shrubs 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 Prairie Sandreed/Western Wheatgrass/Shrubs Plant Community.

Conservation practices

Prescribed Grazing

Pathway 1.2b Community 1.2 to 1.3

Non-use and no fire for extended periods of time will convert this plant community to the Kentucky Bluegrass/Shrubs Plant Community.

Pathway 1.3a Community 1.3 to 1.1

Prescribed grazing combined with brush management will move this plant community to the Prairie Sandreed/Western Wheatgrass/Shrubs Plant Community.

Conservation practices

Brush Management
Prescribed Grazing

State 2 Shortgrass

The State narrative is under development.

Community 2.1 Blue Grama/Western Wheatgrass/Sagewort Plant Community

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 protects some of the remaining decreasers 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 Prairie Sandreed/Western Wheatgrass/Shrubs Plant Community. Loss of cool-season grasses, tall warm-season grasses, shrub component, and nitrogen fixing forbs has 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	1130	1474
Shrub/Vine	62	101	146
Forb	62	101	146
Tree	_	13	28
Total	897	1345	1794

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, 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 bromegrass, annual brome, crested wheatgrass, needleandthread, prairie Junegrass, and western wheatgrass. The dominant forbs include curlycup gumweed, marestail, salsify, kochia, field bindweed, thistles, western raqweed, 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 nonnative species due to severe soil disturbances and relatively high percent of bare ground. Many annual and perennial forbs, including nonnative species, have invaded the site. This plant community is resistant to change towards the Prairie Sandreed/Western Wheatgrass/Shrubs 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	Мау	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

Cropped go-back with continuous grazing; heavy continuous seasonal grazing; excessive defoliation, or seeding with introduced species may lead this plant community over a threshold to the Go-back, Introduced, Invaded State

Transition T3 State 1 to 3

Cropped go-back with continuous grazing; heavy continuous seasonal grazing; excessive defoliation, or seeding with introduced species may lead this plant community over a threshold to the Go-back, Introduced, Invaded State

Transition T3 State 1 to 3 Cropped go-back with continuous grazing; heavy continuous seasonal grazing; excessive defoliation, or seeding with introduced species may lead this plant community 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 Prairie Sandreed/Western Wheatgrass/Shrubs 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

Cropped go-back with continuous grazing; heavy continuous seasonal grazing; excessive defoliation, or seeding with introduced species may lead this plant community over a threshold to the Go-back, Introduced, Invaded State

Restoration pathway R3 State 3 to 1

Range seeding, along with intensive management, may eventually result in a plant community resembling the Reference Plant Community.

Additional community tables

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)	
Grass	/Grasslike		·			
1	Tall Warm-Season Grasse	:S		560–981		
	prairie sandreed	CALO	Calamovilfa longifolia	420–841	_	
	big bluestem	ANGE	Andropogon gerardii	56–280	_	
	switchgrass	PAVI2	Panicum virgatum	0–196	_	
	composite dropseed	SPCOC2	Sporobolus compositus var. compositus	0–140	_	
2	Wheatgrasses		280–701			
	western wheatgrass	PASM	Pascopyrum smithii	280–701	_	
	slender wheatgrass	ELTR7	Elymus trachycaulus	56–280	_	
3	Cool-Season Bunchgrass	es		280–560		
	needle and thread	HECOC8	Hesperostipa comata ssp. comata	140–420	_	
	green needlegrass	NAVI4	Nassella viridula	56–224	_	
	Canada wildrye	ELCA4	Elymus canadensis	28–140	_	
	porcupinegrass	HESP11	Hesperostipa spartea	0–140	_	
4	Warm-Season Bunchgras	ses		56–280		
	blue grama	BOGR2	Bouteloua gracilis	28–196	_	
	little bluestem	SCSC	Schizachyrium scoparium	28–168	_	
5	Other Native Grasses	Other Native Grasses				
	Graminoid (grass or grass-	2GRAM	Graminoid (grass or grass-like)	0–112	_	

Table 9. Community 1.1 plant community composition

	like)	-		-	
	plains reedgrass	CAMO	Calamagrostis montanensis	0–84	_
	prairie Junegrass	КОМА	Koeleria macrantha	28–84	_
6	Grass-likes	4	<u> </u>	28–140	
	sedge	CAREX	Carex	28–140	_
	Grass-like (not a true grass)	2GL	Grass-like (not a true grass)	0–84	-
Forb		•			
8	Forbs			56–224	
	Forb, native	2FN	Forb, native	28–112	_
	western marbleseed	ONBEO	Onosmodium bejariense var. occidentale	0–56	_
	scurfpea	PSORA2	Psoralidium	28–56	_
	upright prairie coneflower	RACO3	Ratibida columnifera	28–56	-
	goldenrod	SOLID	Solidago	0–56	-
	white prairie aster	SYFA	Symphyotrichum falcatum	28–56	-
	longbract spiderwort	TRBR	Tradescantia bracteata	28–56	_
	American vetch	VIAM	Vicia americana	28–56	_
	field sagewort	ARCA12	Artemisia campestris	28–56	-
	white sagebrush	ARLU	Artemisia ludoviciana	28–56	-
	wavyleaf thistle	CIUN	Cirsium undulatum	28–56	
	purple prairie clover	DAPU5	Dalea purpurea	28–56	
	scarlet beeblossom	GACO5	Gaura coccinea	28–56	_
	Maximilian sunflower	HEMA2	Helianthus maximiliani	0–56	-
	hoary puccoon	LICA12	Lithospermum canescens	0–56	_
	dotted blazing star	LIPU	Liatris punctata	28–56	_
	rush skeletonplant	LYJU	Lygodesmia juncea	0–28	_
	mint	MENTH	Mentha	0–28	_
	western yarrow	ACMIO	Achillea millefolium var. occidentalis	0–28	_
Shrub	/Vine				
9	Shrubs		1	140–420	
	Shrub (>.5m)	2SHRUB	Shrub (>.5m)	28–140	-
	silver sagebrush	ARCA13	Artemisia cana	56–140	-
	western snowberry	SYOC	Symphoricarpos occidentalis	28–140	_
	American plum	PRAM	Prunus americana	28–112	-
	chokecherry	PRVI	Prunus virginiana	28–112	-
	leadplant	AMCA6	Amorpha canescens	28–112	_
	rose	ROSA5	Rosa	28–84	_
	prairie sagewort	ARFR4	Artemisia frigida	28–84	_
	big sagebrush	ARTR2	Artemisia tridentata	0-84	_
Tree	1				
10	Trees	1	1	0–56	
	Tree	2TREE	Tree	0–56	_
	boxelder	ACNE2	Acer negundo	0–56	-

green ash	FRPE	Fraxinus pennsylvanica	0–56	_
plains cottonwood	PODEM	Populus deltoides ssp. monilifera	0–56	-
American elm	ULAM	Ulmus americana	0–56	-

Table 10. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass	/Grasslike			•	
1	Tall Warm-Season Grasse	S		38–191	
	prairie sandreed	CALO	Calamovilfa longifolia	38–191	_
	composite dropseed	SPCOC2	Sporobolus compositus var. compositus	0–76	-
	big bluestem	ANGE	Andropogon gerardii	0–38	-
	switchgrass	PAVI2	Panicum virgatum	0–19	_
2	Wheatgrasses			286–572	
	western wheatgrass	PASM	Pascopyrum smithii	286–572	_
	slender wheatgrass	ELTR7	Elymus trachycaulus	0–95	_
3	Cool-Season Bunchgrasse	es		95–286	
	needle and thread	HECOC8	Hesperostipa comata ssp. comata	38–191	_
	green needlegrass	NAVI4	Nassella viridula	0–76	_
	Canada wildrye	ELCA4	Elymus canadensis	0–57	_
	porcupinegrass	HESP11	Hesperostipa spartea	0–38	_
4	Warm-Season Bunchgrass	ses		95–381	
	blue grama	BOGR2	Bouteloua gracilis	95–381	_
	little bluestem	SCSC	Schizachyrium scoparium	0–57	_
5	Other Native Grasses			19–95	
	Graminoid (grass or grass- like)	2GRAM	Graminoid (grass or grass-like)	0–57	_
	prairie Junegrass	KOMA	Koeleria macrantha	19–57	-
	plains reedgrass	CAMO	Calamagrostis montanensis	0–38	-
6	Grass-likes	-		19–191	
	sedge	CAREX	Carex	19–191	_
	Grass-like (not a true grass)	2GL	Grass-like (not a true grass)	0–57	-
7	anada wildryeELCA4prcupinegrassHESP11'arm-Season Bunchgrassesue gramaBOGR2tle bluestemSCSCther Native GrassesSCSCther Native Grasses2GRAMraminoid (grass or grass- (e)2GRAM'airie JunegrassCAMOrass-likesCAREXedgeCAREXrass-like (not a true rass)2GLon-Native GrassesPOAneatgrassBRTEorbsarth introduced			19–191	
	bluegrass	POA	Poa	19–171	_
	cheatgrass	BRTE	Bromus tectorum	0–95	_
Forb					
8	Forbs			38–152	
	Forb, introduced	2FI	Forb, introduced	0–95	_
	Forb, native	2FN	Forb, native	19–76	_
	scurfpea	PSORA2	Psoralidium	19–57	_
	field sagewort	ARCA12	Artemisia campestris	19–57	_
	white sagebrush	ARLU	Artemisia ludoviciana	19–57	_
	goldenrod	SOLID	Solidago	19–57	
	I	1			

	white prairie aster	SYFA	Symphyotrichum falcatum	19–57	_
	wavyleaf thistle	CIUN	Cirsium undulatum	0–38	_
	upright prairie coneflower	RACO3	Ratibida columnifera	0–38	_
	western yarrow	ACMIO	Achillea millefolium var. occidentalis	19–38	-
	purple prairie clover	DAPU5	Dalea purpurea	0–19	-
	scarlet beeblossom	GACO5	Gaura coccinea	0–19	-
	dotted blazing star	LIPU	Liatris punctata	0–19	-
	rush skeletonplant	LYJU	Lygodesmia juncea	0–19	-
	longbract spiderwort	TRBR	Tradescantia bracteata	0–19	-
	American vetch	VIAM	Vicia americana	0–19	-
Shrub	/Vine	-			
9	Shrubs			95–191	
	prairie sagewort	ARFR4	Artemisia frigida	19–95	-
	western snowberry	SYOC	Symphoricarpos occidentalis	19–95	-
	Shrub (>.5m)	2SHRUB	Shrub (>.5m)	0–76	-
	silver sagebrush	ARCA13	Artemisia cana	0–57	_
	leadplant	AMCA6	Amorpha canescens	0–38	-
	American plum	PRAM	Prunus americana	0–38	-
	chokecherry	PRVI	Prunus virginiana	0–38	-
	rose	ROSA5	Rosa	19–38	_
	big sagebrush	ARTR2	Artemisia tridentata	0–19	-
Tree		-			
10	Trees			0–38	
	Tree	2TREE	Tree	0–38	-
	boxelder	ACNE2	Acer negundo	0–38	
	green ash	FRPE	Fraxinus pennsylvanica	0–38	
	plains cottonwood	PODEM	Populus deltoides ssp. monilifera	0–38	-
	American elm	ULAM	Ulmus americana	0–38	

Table 11. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)		
Grass	/Grasslike						
1	Tall Warm-Season Grasse	Tall Warm-Season Grasses					
	prairie sandreed	CALO	Calamovilfa longifolia	22–179	_		
	composite dropseed	SPCOC2	Sporobolus compositus var. compositus	0–67	_		
	big bluestem	ANGE	Andropogon gerardii	0–45	_		
	switchgrass	PAVI2	Panicum virgatum	0–22	_		
2	Wheatgrasses	-		112–336			
	western wheatgrass	PASM	Pascopyrum smithii	112–336	_		
	slender wheatgrass	ELTR7	Elymus trachycaulus	0–112	_		
3	Cool-Season Bunchgrass	Cool-Season Bunchgrasses					
	needle and thread	HECOC8	Hesperostipa comata ssp. comata	45–224	_		
	·	• • • • • • •					

	green needlegrass	NAVI4	Nassella viridula	22–135	_
	porcupinegrass	HESP11	Hesperostipa spartea	0–67	_
	Canada wildrye	ELCA4	Elymus canadensis	0–67	_
4	Warm-Season Bunchgrass	ses		22–224	
	blue grama	BOGR2	Bouteloua gracilis	22–224	_
	little bluestem	SCSC	Schizachyrium scoparium	0–90	-
5	Other Native Grasses	-		22–112	
	Graminoid (grass or grass- like)	2GRAM	Graminoid (grass or grass-like)	0–112	-
	plains reedgrass	CAMO	Calamagrostis montanensis	0–67	-
	prairie Junegrass	KOMA	Koeleria macrantha	22–45	_
6	Grass-likes	-		22–224	
	sedge	CAREX	Carex	22–224	-
	Grass-like (not a true grass)	2GL	Grass-like (not a true grass)	0–67	-
7	Non-Native Grasses	-		336–673	
	bluegrass	POA	Poa	336–673	_
	cheatgrass	BRTE	Bromus tectorum	0–179	_
Forb		-			
8	Forbs			112–224	
	Forb, introduced	2FI	Forb, introduced	0–112	_
	Forb, native	2FN	Forb, native	22–90	_
	white sagebrush	ARLU	Artemisia ludoviciana	22–90	-
	goldenrod	SOLID	Solidago	22–90	-
	scurfpea	PSORA2	Psoralidium	22–90	-
	white prairie aster	SYFA	Symphyotrichum falcatum	22–67	-
	western yarrow	ACMIO	Achillea millefolium var. occidentalis	22–67	-
	field sagewort	ARCA12	Artemisia campestris	22–67	-
	Maximilian sunflower	HEMA2	Helianthus maximiliani	0–45	_
	hoary puccoon	LICA12	Lithospermum canescens	0–22	-
	dotted blazing star	LIPU	Liatris punctata	0–22	_
	rush skeletonplant	LYJU	Lygodesmia juncea	0–22	_
	mint	MENTH	Mentha	0–22	-
	western marbleseed	ONBEO	Onosmodium bejariense var. occidentale	0–22	-
	longbract spiderwort	TRBR	Tradescantia bracteata	0–22	_
	American vetch	VIAM	Vicia americana	0–22	_
	wavyleaf thistle	CIUN	Cirsium undulatum	0–22	_
	purple prairie clover	DAPU5	Dalea purpurea	0–22	_
	scarlet beeblossom	GACO5	Gaura coccinea	0–22	_
	upright prairie coneflower	RACO3	Ratibida columnifera	0–22	_
Shrub	/Vine	-			
9	Shrubs			224–448	
	silver sagebrush	ARCA13	Artemisia cana	45–179	_
	waatara anawharry	evor	Sumphariaarnaa aaaidantalia	00 170	

	western showberry	3100	Symphonicarpos occidentaiis	22-179	_
	Shrub (>.5m)	2SHRUB	Shrub (>.5m)	22–112	-
	leadplant	AMCA6	Amorpha canescens	22–112	-
	American plum	PRAM	Prunus americana	22–112	-
	chokecherry	PRVI	Prunus virginiana	22–112	-
	big sagebrush	ARTR2	Artemisia tridentata	0–90	-
	rose	ROSA5	Rosa	22–67	-
	prairie sagewort	ARFR4	Artemisia frigida	22–67	-
Tree		-	-		
10	Trees			0–45	
	Tree	2TREE	Tree	0–45	-
	boxelder	ACNE2	Acer negundo	0–45	-
	green ash	FRPE	Fraxinus pennsylvanica	0–45	-
	plains cottonwood	PODEM	Populus deltoides ssp. monilifera	0–45	-
	American elm	ULAM	Ulmus americana	0–45	-

Table 12. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass	/Grasslike	-		•	
1	Tall Warm-Season Grasse	s		0–67	
	prairie sandreed	CALO	Calamovilfa longifolia	0–67	_
	composite dropseed	SPCOC2	Sporobolus compositus var. compositus	0–27	_
2	Wheatgrasses		67–202		
	western wheatgrass	PASM	Pascopyrum smithii	67–202	_
	slender wheatgrass	ELTR7	Elymus trachycaulus	0–13	_
3	Cool-Season Bunchgrasse	es		13–94	
	needle and thread	HECOC8	Hesperostipa comata ssp. comata	13–94	-
	green needlegrass	NAVI4	Nassella viridula	0–13	_
4	Warm-Season Bunchgrass	ses		269–538	
	blue grama	BOGR2	Bouteloua gracilis	269–538	-
	little bluestem	SCSC	Schizachyrium scoparium	0–27	_
5	Other Native Grasses			13–67	
	Graminoid (grass or grass- like)	2GRAM	Graminoid (grass or grass-like)	0–40	-
	prairie Junegrass	KOMA	Koeleria macrantha	13–40	_
	plains reedgrass	CAMO	Calamagrostis montanensis	0–13	-
6	Grass-likes	•		13–135	
	sedge	CAREX	Carex	13–135	-
	Grass-like (not a true grass)	2GL	Grass-like (not a true grass)	0–40	_
7	Non-Native Grasses			67–202	
	bluegrass	POA	Poa	27–161	_
	cheatgrass	BRTE	Bromus tectorum	13–108	_
Forb	•	-			

8	Forbs		67–135		
	white sagebrush	ARLU	Artemisia Iudoviciana	13–81	_
	Forb, introduced	2FI	Forb, introduced	0–67	-
	Forb, native	2FN	Forb, native	13–67	_
	field sagewort	ARCA12	Artemisia campestris	13–67	_
	western yarrow	ACMIO	Achillea millefolium var. occidentalis	13–54	_
	scurfpea	PSORA2	Psoralidium	13–40	_
	goldenrod	SOLID	Solidago	13–40	_
	white prairie aster	SYFA	Symphyotrichum falcatum	13–40	_
	rush skeletonplant	LYJU	Lygodesmia juncea	0–13	_
Shrub	/Vine	-			
9	Shrubs			67–135	
	prairie sagewort	ARFR4	Artemisia frigida	27–108	-
	western snowberry	SYOC	Symphoricarpos occidentalis	13–67	-
	Shrub (>.5m)	2SHRUB	Shrub (>.5m)	0–40	-
	silver sagebrush	ARCA13	Artemisia cana	0–40	_
	rose	ROSA5	Rosa	13–27	-
	American plum	PRAM	Prunus americana	0–13	-
	chokecherry	PRVI	Prunus virginiana	0–13	-
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 Sandy Terrace 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, Loamy 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 fringed sagewort, 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 doughtiness of this site, cottonwood establishment does not occur. This site is subject to invasion of grass species such as annual bromegrasses and Kentucky bluegrass. Woody species such as Eastern red cedar, Rocky Mountain juniper, and Russian-olive may invade this site.

The Sandy 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.

Prairie Sandreed/Western Wheatgrass/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 grazing or continuous seasonal grazing without adequate recovery periods between grazing events or increased fire frequency, western wheatgrass and blue grama will dominate. Shrub density has decreased but diversity has remained unchanged. The tree component is aging and the tree diversity and density remains largely unchanged. Livestock damage to trees is often noticeable. The decrease in shrub numbers 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 and silver sagebrush to increase in numbers. 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 heavy, continuous 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 fringed sagewort are increased. Tree vigor and canopy are reduced through various stressors. The reduction in diversity and numbers of the 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 bromegrasses, bluegrasses, crested wheatgrass, and other nonnative 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 provides 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: Stan Boltz, RMS, NRCS; Dave Dewald, Wildlife BIO, NRCS; Jody Forman, RMS, NRCS; Dennis Froemke, RMS, NRCS; and Darrell Vanderbusch, Soil Scientist, NRCS.

Other references

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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
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Date	05/07/2010
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 10 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 4 to 12 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.

12. Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):

Dominant: Tall warm-season grasses > Mid/tall rhizomatous cool-season grasses >

Sub-dominant: Mid/tall cool-season bunchgrasses > Shrubs >

Other: Warm-season bunchgrasses > Forbs > Grass-likes > Trees

Additional: Due to differing root structure and distribution, Kentucky bluegrass and smooth bromegrass do not fit into reference plant community F/S groups.

- 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 annualproduction): 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.