USDA Natural Resources
Conservation Service

Ecological site R063AY008SD
Sands

Accessed: 05/19/2024

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.

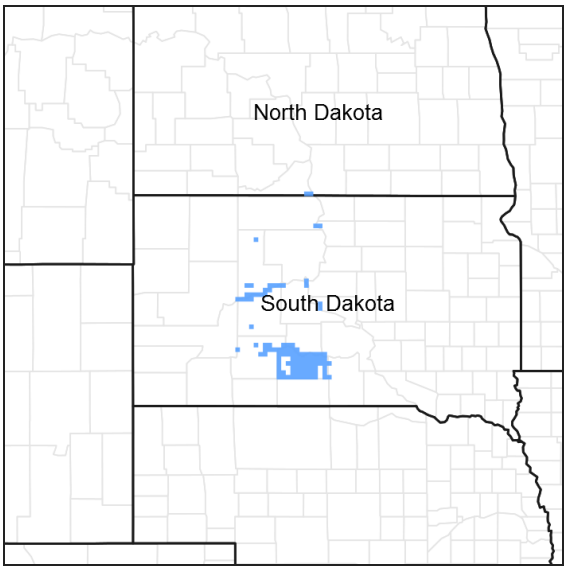


Figure 1. Mapped extent

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.

MLRA notes

Major Land Resource Area (MLRA): 063A–Northern Rolling Pierre Shale Plains

MLRA 63A is approximately 10,160 square miles in size, the majority of which is in South Dakota and a very small portion in North Dakota. The MLRA extends west of the northern half of the South Dakota reach of the Missouri River. All five of the major rivers draining western South Dakota cross this area. From north to south, these are the Grand, Moreau, Cheyenne, Bad, and White Rivers.

Elevation range from 1,300 to 1,640 feet on the bottom land along the Missouri River to 1,640 to 2,950 feet on the shale plain uplands. Cretaceous Pierre Shale underlies almost all of this area. This is a marine sediment having layers of volcanic ash that has been altered to smectitic clays. These clays shrink as they dry and swell as they get wet. Tertiary and Quaternary river deposits, remnants of erosion from the Black Hills uplift, cap isolated highlands in this area. Deposits of alluvial sand and gravel occur on the valley floors adjacent to the major streams in the area. The average annual precipitation in this area is 15 to 20 inches.
The vegetation in this area is a transition from eastern tall grass prairie to a western mixed grass prairie, (USDA-NRCS, Ag Handbook 296).

Classification relationships

Land Resource Region (LRR): G - Western Great Plains Range and Irrigated Region, Major Land Resource Area (MLRA): 63A Northern Rolling Pierre Shale Plains, (USDA-NRCS, Ag Handbook 296).

Level IV Ecoregions of the Conterminous United States, 2013: 43c – River Breaks and 43f – Subhumid Pierre Shale Plains.

Ecological site concept

The Sands Ecological Site occurs throughout the MLRA. It is located on flood plains and low stream terraces. It receives additional moisture from periodic flooding and run in from adjacent sites. Typical slope ranges from 0 to 6 percent. Soils are deep, (greater than 20 inches) with surface textures ranging from loamy fine sand or fine sand. Subsurface textures range from loam to sand. Vegetation in reference consists of a mix of warm- and cool-season grasses. The dominant grasses include big or sand bluestem, prairie sandreed, little bluestem, western wheatgrass and needleandthread. Other grasses include sideoats grama, switchgrass and prairie junegrass. Forbs are common and diverse, common shrubs include silver sage, sand sage, leadplant and rose. Tree species include, green ash, boxelder and cottonwood.

A Sandy Lowland site needs to be developed as the soils correlated to the Sands site are all located in lowland positions (flood plains and low stream terraces). The State and Transition Model (STM) and Plant Community Phases for the Sands Site are written for upland landscapes. For a comparable Sandy Lowland Site, refer to the Loamy Terrace Site R063AY022SD.

Associated sites

R063AY009SD	**Sandy**
R063AY020SD	**Loamy Overflow**
R063AY022SD	**Loamy Terrace**

Similar sites

R063AY009SD	**Sandy** Sandy [more western wheatgrass; less sand bluestem; less slope]

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Andropogon hallii* (2) *Calamovilfa longifolia*

Physiographic features

This site typically occurs on gently sloping lands, typically in valleys.

Table 2. Representative physiographic features

Landforms	(1) Flood plain (2) Terrace
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Rare to occasional
Elevation	488–823 m
Slope	0–6%
Water table depth	203 cm
Aspect	Aspect is not a significant factor

Climatic features

MLRA 63A is considered to have a continental climate – cold winters and hot summers, low humidity, light rainfall, and much sunshine. Extremes in temperature may also abound. The climate is the result of this MLRA's location near the geographic center of North America. There are few natural barriers on the Northern Great Plains and air masses move freely across the plains and account for rapid changes in temperature.

Annual precipitation ranges from 16 to 20 inches per year. The average annual temperature is about 47°F. January is the coldest month with average temperatures ranging from about 11°F (Pollock, South Dakota (SD)), to about 22°F (Cedar Butte, SD). July is the warmest month with temperatures averaging from about 72°F (Pollock, SD), to about 76°F (Cedar Butte, SD). The range of normal average monthly temperatures between the coldest and warmest months is about 58°F. This large annual range attests to the continental nature of this area's climate. Hourly winds are estimated to average about 11 miles per hour 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 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)	130 days
Freeze-free period (average)	151 days
Precipitation total (average)	483 mm

Climate stations used

- (1) POLLOCK [USC00396712], Pollock, SD
- (2) CEDAR BUTTE 1NE [USC00391539], White River, SD
- (3) COTTONWOOD 2 E [USC00391972], Kadoka, SD
- (4) KENNEBEC [USC00394516], Kennebec, SD

Influencing water features

No wetland features are directly associated with this site.

Soil features

The soils in this site are somewhat excessively to excessively drained and formed in alluvium. The surface layer is 4 to 10 inches thick. The surface texture is typically loamy fine sand or fine sand, while the texture of the subsurface ranges from loam to sand. Slopes range from zero to six percent. This site should show slight to no evidence of rills, wind scoured areas, or pedestalled plants. Water flow paths will typically not be present. The soil surface is stable and intact.

These soils are mainly susceptible to water erosion. The hazard of water erosion increases where vegetative cover is low or in poor condition. Occasional erosion may occur with flooding events. Low available water capacity influences the soil-water-plant relationship. Loss of the soil surface layer can result in a shift in species composition and/or production.

Soils correlated to the Sands Ecological Site: Bankard and Inavale

Table 4. Representative soil features

Surface texture	(1) Loamy fine sand (2) Fine sand (3) Very fine sandy loam

Family particle size	(1) Sandy
Drainage class	Somewhat excessively drained to excessively drained
Permeability class	Rapid to very rapid
Soil depth	203 cm
Surface fragment cover <=3"	0–20%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	7.62–10.16 cm
Calcium carbonate equivalent (0-101.6cm)	0–10%
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)	0–65%
Subsurface fragment volume >3" (Depth not specified)	0–5%

Ecological dynamics

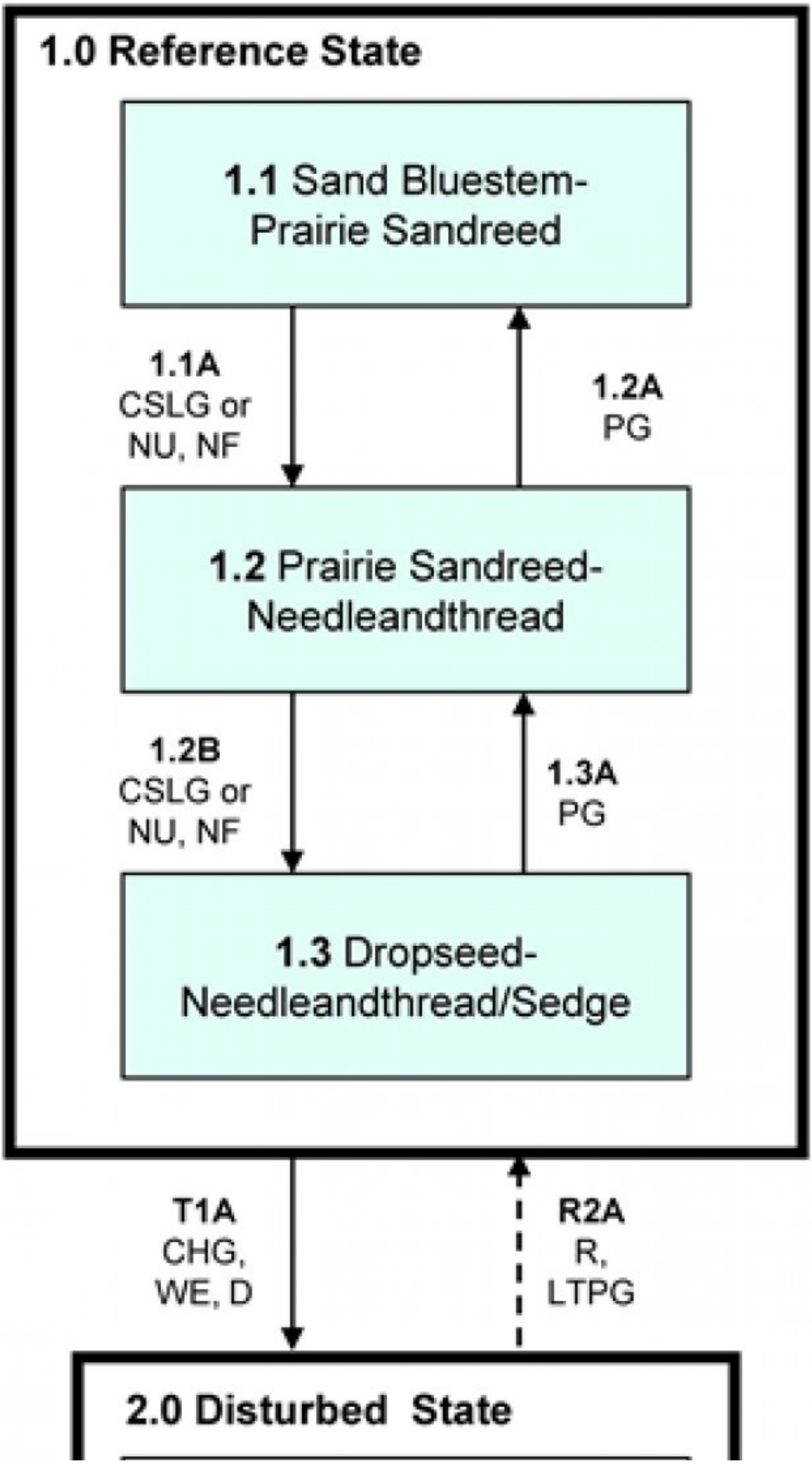
This site developed under Northern Great Plains climatic conditions, light to severe grazing by bison and other large herbivores, sporadic natural or man-caused wildfire (often of light intensities), and other biotic and abiotic factors that typically influence soil/site development. Changes will occur in the plant communities due to short-term weather variations, impacts of native and/or exotic plant and animal species, and management actions. While the following plant community descriptions describe more typical transitions 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.

Interpretations are primarily based on the Sand Bluestem-Prairie Sandreed Plant Community (1.1), which is considered to be reference plant community. It has been determined by study of rangeland relic areas, areas protected from excessive disturbance, and areas under long-term rotational grazing regimes. Trends in plant community dynamics ranging from heavily grazed to lightly grazed areas, seasonal use pastures, and historical accounts, also have been used. Plant communities, states, transitional pathways, and thresholds have been determined through similar studies and experience.

Continuous season-long grazing (during the typical growing season of May through October) and/or repeated seasonal grazing (e.g., every spring, every summer) without adequate recovery periods following each grazing occurrence, causes this site to depart from the Sand Bluestem-Prairie Sandreed Plant Community. Species such as sand dropseed and blue grama will increase, while sand bluestem and little bluestem will decrease.

The following diagram illustrates the common plant communities and vegetation states commonly occurring on the site and the transition pathways between communities and states. The ecological processes will be discussed in more detail in the plant community descriptions following the diagram.

State and transition model


1.0 Reference State
1.1 Sand Bluestem-Prairie Sandreed
1.1A CSLG or NU, NF
1.2A PG
1.2 Prairie Sandreed-Needleandthread
1.2B CSLG or NU, NF
1.3A PG
1.3 Dropseed-Needleandthread/Sedge
T1A CHG, WE, D
R2A R, LTPG
2.0 Disturbed State

CHG – Continuous heavy grazing
CSLG – Continuous season-long grazing
LTPG – Long-term prescribed grazing
NU – No use
NF - no fire
PG – Prescribed grazing
R – Restoration
WE – Wind Erosion
– – ➤ Recovery may not be feasible.

Figure 6. Sands - R063AY008SD

Diagram Legend - Sands - R063AY008SD

T1A	Heavy continuous grazing or heavy grazing in combination with drought, wind erosion.	
R2A	Restoration of blowout, including site stabilization, shaping, mulching, seeding followed by long-term prescribed grazing with change is season of use and time for adequate recovery.	
CP 1.1A	1.1 - 1.2	Continuous season-long grazing or no use and no fire.
CP 1.2A	1.2 - 1.1	Prescribed grazing with proper stocking, change is season of use and adequate time for recovery.
CP 1.2B		Continuous season-long grazing or no use and no fire.
CP 1.3A	1.2 - 1.1	Prescribed grazing with proper stocking, change is season of use and adequate time for recovery.

Figure 7. Sands - R063AY008SD

State 1
Reference State

This State represents what is believed to show the natural range of variability that dominated the dynamics of the ecological site prior to European settlement. This site in Reference, is dominated by warm-season grasses and sub-dominant cool-season grass. Grazing or the lack of grazing, fire and wind erosion are the major drivers between plant communities.

Community 1.1
Sand Bluestem-Prairie Sandreed Plant Community

Interpretations are based primarily on the Sand Bluestem-Prairie Sandreed Plant Community (this is also considered to be reference plant community). This site can be found on areas that are properly managed with grazing and/or prescribed burning and on areas receiving occasional short periods of rest. The potential vegetation is about 85 percent grasses or grass-likes, 10 percent forbs, and 5 percent shrubs. The site is dominated by tall and mid-grasses. The major grasses include sand bluestem, prairie sandreed, little bluestem, and needleandthread. Other species occurring on the site include sand dropseed, hairy grama, blue grama, switchgrass, and sedge. Forbs and shrubs such as penstemon, gayfeather, rose, leadplant, and sand sagebrush are significant. This plant community is well adapted to the Northern Great Plains climatic conditions. Community dynamics, nutrient cycle, water cycle, and energy flow are functioning at the site's potential. Plant litter is properly distributed with some movement off-site and natural plant mortality is low. The high plant diversity allows for high drought tolerance.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1894	2287	2746
Shrub/Vine	118	202	308
Forb	118	202	308
Total	**2130**	**2691**	**3362**

Figure 9. Plant community growth curve (percent production by month). SD6305, Pierre Shale Plains, warm-season dominant.. Warm-season dominant, uplands..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	2	5	15	25	30	15	7	1	0	0

Community 1.2
Prairie Sandreed-Needleandthread Plant Community

This plant community developed under continuous season-long grazing or no use and no fire. The plant community's mid-grass component is reduced and an understory of short sod-forming grasses is increasing. The potential vegetation is about 85 percent grasses or grass-likes, 10 percent forbs, and 5 percent shrubs. The dominant grasses include needleandthread and prairie sandreed. Other grasses and grass-likes include blue grama, sideoats grama, western wheatgrass, and sedge. Forbs commonly found in this plant community include cudweed sagewort, goldenrod, green sagewort, scurfpea, and western ragweed. Shrubs in this community include rose and fringed sagewort. When compared to the Sand Bluestem-Prairie Sandreed Plant Community (1.1), sand bluestem, and little bluestem have decreased. Prairie sandreed is beginning to decline. Needleandthread, blue grama, and sand dropseed are increasing. Plant diversity is high, but on a downward trend. This plant community is not resistant to change. Management changes can easily shift this plant community. Soil erosion is low. The water cycle is functioning, infiltration is high, and runoff is low.

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1367	1809	2208
Shrub/Vine	101	160	241
Forb	101	160	241
Total	**1569**	**2129**	**2690**

Figure 11. Plant community growth curve (percent production by month). SD6304, Pierre Shale Plains, warm-season dominant, cool-season subdominant. Warm-season dominant, cool-season subdominant.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	7	17	25	25	15	7	1	0	0

Community 1.3
Dropseed-Needleandthread/Sedge Plant Community

This plant community typically developed over a period of several years under continuous season long grazing with inadequate deferment during the growing season. This plant community is made up of about 70 to 85 percent grasses and grass-likes, 5 to 15 percent forbs, and 5 to 15 percent shrubs. Short, drought tolerant grasses dominate. Occasional mid-grasses may be found within the canopy of the shrubs where it is protected from grazing. The dominant grasses are sand dropseed, threadleaf sedge, blue grama, hairy grama, and needleandthread. Other grasses and grass-likes present include switchgrass and little bluestem. The dominant forbs include cudweed sagewort, scurfpea, and western ragweed. Common shrubs include fringed sagewort, and yucca. Compared to the Sand Bluestem-Prairie Sandreed Plant Community (1.1), sand dropseed, blue grama, and hairy grama have increased. Sand bluestem and prairie sandreed have decreased dramatically. Annual forbs will begin to invade the site. The plant diversity and production has decreased compared to the Sand Bluestem-Prairie Sandreed Plant Community.

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	773	1076	1345
Shrub/Vine	62	135	224
Forb	62	135	224
Total	**897**	**1346**	**1793**

Figure 13. Plant community growth curve (percent production by month). SD6304, Pierre Shale Plains, warm-season dominant, cool-season subdominant. Warm-season dominant, cool-season subdominant.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	7	17	25	25	15	7	1	0	0

Pathway 1.1A
Community 1.1 to 1.2

Continuous season-long grazing or nonuse and no fire will convert the plant community to the Prairie Sandreed-Needleandthread Plant Community (1.2).

Pathway 1.2A
Community 1.2 to 1.1

Prescribed grazing will adequate precipitation and recovery time from grazing occurrences will move this plant community toward the Sand Bluestem-Prairie Sandreed Plant Community (1.1).

Pathway 1.2B
Community 1.2 to 1.3

Continuous season-long grazing or no use and no fire will convert the plant community to the Dropseed-Needleandthread/Sedge Plant Community (1.3).

Pathway 1.3A
Community 1.3 to 1.2

Prescribed grazing will move this plant community back towards the Prairie Sandreed-Needleandthread Plant Community (1.2). The rate of this transition can be extremely variable depending on the species present on the site and the availability of a seed source.

State 2
Disturbed State

This State can be reached from any other plant community with significant disturbances such as heavy grazing, and repeated wildfire. Large areas of blowing sand result in movement and possible enlargement of the blowout. Evaporation and transpiration of the few existing plants are extremely high due to bare ground, lack of litter.

Community 2.1
Blowout Plant Community

This plant community is in a low successional stage from poor soil development, and sporadic herbivore use. Sandhill muhly and blowout grass are present due to their drought tolerance. Continuous grazing will only increase the size of the blowouts. This condition is not stable. It consists of bare areas that are continually eroded by wind.

Transition 1A
State 1 to 2

Continuous heavy grazing in combination with drought and excessive wind erosion will transition the Reference State (1.0) to the Disturbed State (2.0).

Restoration pathway 2A
State 2 to 1

Restoration which can include shaping, mulching, and potentially seeding, followed by long-term prescribed grazing, which may include extended periods of deferment or no use can be used to transition this plant community back to the Reference State (1.0). This restoration may pathway may not be fast or in the end meet management goals.

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	**Bluestem**			538–942	
	sand bluestem	ANHA	*Andropogon hallii*	404–942	–
	big bluestem	ANGE	*Andropogon gerardii*	0–269	–
2	**Tall Warm-Season Grasses**			269–673	
	prairie sandreed	CALO	*Calamovilfa longifolia*	269–673	–
	switchgrass	PAVI2	*Panicum virgatum*	0–135	–
3	**Needlegrass**			135–404	
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	135–404	–
4	**Mid Warm-Season Grasses**			135–404	
	little bluestem	SCSC	*Schizachyrium scoparium*	135–404	–
	blowout grass	REFL	*Redfieldia flexuosa*	0–81	–
5	**Short Warm-Season Grasses**			54–269	
	blue grama	BOGR2	*Bouteloua gracilis*	0–135	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	0–135	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–135	–
	sandhill muhly	MUPU2	*Muhlenbergia pungens*	0–81	–
6	**Other Native Grasses**			27–135	
	Graminoid (grass or	2GRAM	Graminoid (grass or grass-like)	0–135	

	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	0–135	–
	Scribner's rosette grass	DIOLS	*Dichanthelium oligosanthes var. scribnerianum*	27–54	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–54	–
	sixweeks fescue	VUOC	*Vulpia octoflora*	0–27	–
7	**Grass-likes**			27–135	
	threadleaf sedge	CAFI	*Carex filifolia*	27–135	–
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	0–81	–
Forb					
9	**Forbs**			135–269	
	Forb, native	2FN	*Forb, native*	0–135	–
	prairie clover	DALEA	*Dalea*	27–81	–
	common sunflower	HEAN3	*Helianthus annuus*	0–54	–
	stiff sunflower	HEPA19	*Helianthus pauciflorus*	27–54	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	27–54	–
	tarragon	ARDR4	*Artemisia dracunculus*	27–54	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	27–54	–
	false boneset	BREU	*Brickellia eupatorioides*	27–54	–
	bush morning-glory	IPLE	*Ipomoea leptophylla*	0–54	–
	dotted blazing star	LIPU	*Liatris punctata*	27–54	–
	beardtongue	PENST	*Penstemon*	27–54	–
	scurfpea	PSORA2	*Psoralidium*	27–54	–
	Missouri goldenrod	SOMI2	*Solidago missouriensis*	27–54	–
	prairie spiderwort	TROC	*Tradescantia occidentalis*	27–54	–
	white prairie aster	SYFA	*Symphyotrichum falcatum*	0–27	–
	veiny dock	RUVE2	*Rumex venosus*	0–27	–
	rush skeletonplant	LYJU	*Lygodesmia juncea*	0–27	–
	lacy tansyaster	MAPI	*Machaeranthera pinnatifida*	0–27	–
	tenpetal blazingstar	MEDE2	*Mentzelia decapetala*	0–27	–
	Nuttall's evening primrose	OENU	*Oenothera nuttallii*	0–27	–
	wavyleaf thistle	CIUN	*Cirsium undulatum*	0–27	–
	hairy false goldenaster	HEVI4	*Heterotheca villosa*	0–27	–
	annual buckwheat	ERAN4	*Eriogonum annuum*	0–27	–
Shrub/Vine					
10	**Shrubs**			135–269	
	leadplant	AMCA6	*Amorpha canescens*	27–108	–
	soapweed yucca	YUGL	*Yucca glauca*	27–81	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–81	–
	western sandcherry	PRPUB	*Prunus pumila var. besseyi*	27–54	–
	rose	ROSA5	*Rosa*	27–54	–
	western poison ivy	TORY	*Toxicodendron rydbergii*	0–27	–
	prairie sagewort	ARFR4	*Artemisia frigida*	0–27	–
	pricklypear	OPUNT	*Opuntia*	0–27	–

Table 9. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Bluestem**			43–213	
	sand bluestem	ANHA	*Andropogon hallii*	43–213	–
	big bluestem	ANGE	*Andropogon gerardii*	0–64	–
2	**Tall Warm-Season Grasses**			213–639	
	prairie sandreed	CALO	*Calamovilfa longifolia*	213–639	–
	switchgrass	PAVI2	*Panicum virgatum*	0–43	–
3	**Needlegrass**			213–426	
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	213–426	–
4	**Mid Warm-Season Grasses**			106–319	
	little bluestem	SCSC	*Schizachyrium scoparium*	106–319	–
	blowout grass	REFL	*Redfieldia flexuosa*	0–64	–
5	**Short Warm-Season Grasses**			106–213	
	sand dropseed	SPCR	*Sporobolus cryptandrus*	21–213	–
	blue grama	BOGR2	*Bouteloua gracilis*	21–149	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	21–149	–
	sandhill muhly	MUPU2	*Muhlenbergia pungens*	0–106	–
6	**Other Native Grasses**			21–170	
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	0–106	–
	Scribner's rosette grass	DIOLS	*Dichanthelium oligosanthes var. scribnerianum*	21–64	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–43	–
	sixweeks fescue	VUOC	*Vulpia octoflora*	0–43	–
7	**Grass-likes**			43–213	
	threadleaf sedge	CAFI	*Carex filifolia*	43–213	–
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	0–106	–
8	**Non-Native Grasses**			0–149	
	field brome	BRAR5	*Bromus arvensis*	0–149	–
	cheatgrass	BRTE	*Bromus tectorum*	0–149	–
Forb					
9	**Forbs**			106–213	
	Forb, native	2FN	*Forb, native*	0–106	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	21–64	–
	tarragon	ARDR4	*Artemisia dracunculus*	21–64	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	21–64	–
	common sunflower	HEAN3	*Helianthus annuus*	0–64	–
	scurfpea	PSORA2	*Psoralidium*	21–64	–
	Forb, introduced	2FI	*Forb, introduced*	0–64	–
	tenpetal blazingstar	MEDE2	*Mentzelia decapetala*	0–43	–
	veiny dock	RUVE2	*Rumex venosus*	0–43	–

	[illegible]	[illegible]	[illegible]	[illegible]	
	Missouri goldenrod	SOMI2	*Solidago missouriensis*	21–43	–
	prairie clover	DALEA	*Dalea*	0–43	–
	annual buckwheat	ERAN4	*Eriogonum annuum*	0–43	–
	dotted blazing star	LIPU	*Liatris punctata*	21–43	–
	rush skeletonplant	LYJU	*Lygodesmia juncea*	0–21	–
	lacy tansyaster	MAPI	*Machaeranthera pinnatifida*	0–21	–
	white prairie aster	SYFA	*Symphyotrichum falcatum*	0–21	–
	prairie spiderwort	TROC	*Tradescantia occidentalis*	0–21	–
	stiff sunflower	HEPA19	*Helianthus pauciflorus*	0–21	–
	hairy false goldenaster	HEVI4	*Heterotheca villosa*	0–21	–
	bush morning-glory	IPLE	*Ipomoea leptophylla*	0–21	–
	false boneset	BREU	*Brickellia eupatorioides*	0–21	–
	wavyleaf thistle	CIUN	*Cirsium undulatum*	0–21	–
	beardtongue	PENST	*Penstemon*	0–21	–
Shrub/Vine					
10	**Shrubs**			106–213	
	soapweed yucca	YUGL	*Yucca glauca*	21–106	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–64	–
	prairie sagewort	ARFR4	*Artemisia frigida*	0–43	–
	pricklypear	OPUNT	*Opuntia*	0–43	–
	rose	ROSA5	*Rosa*	0–43	–
	western poison ivy	TORY	*Toxicodendron rydbergii*	0–21	–
	western sandcherry	PRPUB	*Prunus pumila var. besseyi*	0–21	–
	leadplant	AMCA6	*Amorpha canescens*	0–21	–

Table 10. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Bluestem**			0–40	
	sand bluestem	ANHA	*Andropogon hallii*	0–40	–
	big bluestem	ANGE	*Andropogon gerardii*	0–13	–
2	**Tall Warm-Season Grasses**			13–135	
	prairie sandreed	CALO	*Calamovilfa longifolia*	13–135	–
3	**Needlegrass**			27–135	
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	27–135	–
4	**Mid Warm-Season Grasses**			13–135	
	little bluestem	SCSC	*Schizachyrium scoparium*	13–135	–
	blowout grass	REFL	*Redfieldia flexuosa*	0–54	–
5	**Short Warm-Season Grasses**			135–404	
	sand dropseed	SPCR	*Sporobolus cryptandrus*	67–269	–
	blue grama	BOGR2	*Bouteloua gracilis*	27–135	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	27–135	–
	sandhill muhly	MUPU2	*Muhlenbergia pungens*	0–67	–

6	**Other Native Grasses**			27–94	
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	0–67	–
	Scribner's rosette grass	DIOLS	*Dichanthelium oligosanthes var. scribnerianum*	13–67	–
	sixweeks fescue	VUOC	*Vulpia octoflora*	13–54	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–27	–
7	**Grass-likes**			67–202	
	threadleaf sedge	CAFI	*Carex filifolia*	67–202	–
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	0–67	–
8	**Non-Native Grasses**			27–135	
	field brome	BRAR5	*Bromus arvensis*	0–135	–
	cheatgrass	BRTE	*Bromus tectorum*	0–135	–
Forb					
9	**Forbs**			67–202	
	Forb, introduced	2FI	*Forb, introduced*	0–94	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	27–81	–
	tarragon	ARDR4	*Artemisia dracunculus*	13–67	–
	Forb, native	2FN	*Forb, native*	0–67	–
	scurfpea	PSORA2	*Psoralidium*	13–67	–
	annual buckwheat	ERAN4	*Eriogonum annuum*	0–54	–
	common sunflower	HEAN3	*Helianthus annuus*	0–54	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	13–40	–
	tenpetal blazingstar	MEDE2	*Mentzelia decapetala*	0–40	–
	veiny dock	RUVE2	*Rumex venosus*	0–27	–
	Missouri goldenrod	SOMI2	*Solidago missouriensis*	0–27	–
	white prairie aster	SYFA	*Symphyotrichum falcatum*	0–13	–
	wavyleaf thistle	CIUN	*Cirsium undulatum*	0–13	–
	dotted blazing star	LIPU	*Liatris punctata*	0–13	–
	rush skeletonplant	LYJU	*Lygodesmia juncea*	0–13	–
Shrub/Vine					
10	**Shrubs**			67–202	
	soapweed yucca	YUGL	*Yucca glauca*	27–135	–
	prairie sagewort	ARFR4	*Artemisia frigida*	13–67	–
	pricklypear	OPUNT	*Opuntia*	0–67	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–40	–
	rose	ROSA5	*Rosa*	0–13	–

Animal community

Animal Community – Grazing Interpretations
The following table lists annual, suggested initial stocking rates with average growing conditions. These are conservative estimates that should be used only as guidelines in the initial stages of conservation planning. Often, the current plant composition does not entirely match any particular plant community (as described in this ecological site description). Because of this, a resource inventory is necessary to document plant composition and production. More accurate carrying capacity estimates should eventually be calculated using the following stocking rate

information along with animal preference data and actual stocking records, particularly when grazers other than cattle are involved. With consultation of the land manager, more intensive grazing management may result in improved harvest efficiencies and increased carrying capacity.

Sand Bluestem-Prairie Sandreed Plant Community (1.1)
Total Annual Production (lbs./acre, air-dry): 2400
Stocking Rate* (AUM/acre): 0.66

Prairie Sandreed-Needleandthread Plant Community (1.2)
Total Annual Production (lbs./acre, air-dry): 1900
Stocking Rate* (AUM/acre): 0.52

Dropseed-Needleandthread/Sedge Plant Community (1.3)
Total Annual Production (lbs./acre, air-dry): 1200
Stocking Rate* (AUM/acre): 0.33

Other Plant Community Phases have highly variable forage production levels. Actual on-site forage inventories will need to be conducted to determine average annual production, stocking rates and timing of grazing.

*Based on 912 lbs./acre (air-dry weight) per Animal Unit Month (AUM), and on 25 percent harvest efficiency of preferred and desirable species (refer to USDA NRCS, National Range and Pasture Handbook).

Total annual production on site may contain vegetation which is deemed undesirable or untargeted by the grazing animal. Therefore, AUM values may have been reduced to reflect only preferred or desirable forage species.

Grazing by domestic livestock is one of the major income-producing industries in the area. Rangeland in this area may provide yearlong forage. During the dormant period, the forage for livestock will likely be lacking protein to meet livestock requirements, and added protein will allow ruminants to better utilize the energy stored in grazed plant materials. A forage quality test (either directly or through fecal sampling) should be used to determine the level of supplementation needed.

Hydrological functions

Water is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group A. Infiltration ranges from moderate to rapid. Runoff potential for this site varies from very low to low depending on slope and ground cover. In many cases, areas with greater than 75 percent ground cover have the greatest potential for high infiltration and lower runoff. An example of an exception would be where shortgrasses form a strong sod and dominate the site. 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, hiking, photography, bird watching, and other opportunities. The wide varieties of plants that bloom from spring until fall have an aesthetic 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.

Other information

Revision Notes: “Previously Approved Provisional
This Provisional ecological site concept has passed Quality Control (QC) and Quality Assurance (QA) to ensure that

the site meets the 2014 NESH standards for a Provisional ecological site. This is an updated “Previously Approved” ESD which represents a first generation tier of documentation that prior to the release of the 2014 National Ecological Site Handbook (NESH), met all requirement as an Approved ESD as laid out in the 2003 National Range and Pasture Handbook (NRPH). The document fully describe the reference state and community phase in the state and transition model. All other alternative states are at least described in narrative form. The “Previously Approved” ESD has been field tested for a minimum of five years and is a proven functional document for conservation planning. The “Previously Approved” ESD does not contain all tabular and narrative entries as required in the current Approved level of documentation but it is expected that the “Previously Approved” ESD will continue refinement towards an Approved status.

Site Development and Testing Plan:
Future work, as described in a Project Plan, to validate the information in this Provisional Ecological Site Description is needed. This will include field activities to collect low, medium and high intensity sampling, soil correlations, and analysis of that data. Annual field reviews should be done by soil scientists and vegetation specialists. A final field review, peer review, quality control, and quality assurance reviews of the ESD will be needed to produce the final document.

Inventory data references

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range-trained personnel were also used. Those involved in developing this site include: April Boltjes, Range Management Specialist (RMS), NRCS; Stan Boltz, RMS, NRCS; Kent Cooley, Soil Scientist, NRCS; Rick Peterson, RMS, NRCS; and L. Michael Stirling, RMS, NRCS. No SCS-RANGE-417 clipping records exist in the national database.

Other references

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Contributors

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Rick L. Peterson updated ESD 9/7/16

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	05/08/2010
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.

3. **Number and height of erosional pedestals or terracettes:** Bunchgrasses may be pedestalled, but no exposed roots should be present.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 5 to 15 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:** Occasional areas associated with increased animal activity (e.g., rodent burrows, animal trailing) may exhibit small wind scoured areas, typically less than 10 feet in diameter.

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):** Some series on this site typically have little organic matter in the surface horizon, and the structure is single grain sand. Soil aggregate stability will be difficult to measure on these soils. Surface organic matter should still adhere to the soil surface. Surface erosion by water rarely occurs due to rapid infiltration, but surface is susceptible to wind erosion if vegetative cover is reduced due to drought or heavy grazing. Biological crusts are often present (up to 10% of the surface) and serve to provide resistance to erosion. The dominant rhizomatous warm-season species are adapted to these coarse soils and when vigorous are vital in preventing erosion by wind.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** A-horizon should be 4 to 10 inches thick. Some soils have little organic matter in the A-horizon and dark grayish brown colors when moist, but possibly not mollic. Structure can be single grain to fine granular parting to single grain in the 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. Infiltration is typically high due to the coarse nature of these soils.

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None.

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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: Big and/or sand bluestem > Tall warm-season rhizomatous grasses >

    Sub-dominant: Mid cool-season bunchgrasses = Mid warm-season bunchgrasses >

    Other: Short warm-season grasses = Forbs = Shrubs > Grass-likes > Short cool-season bunchgrasses

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Very little 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 1,900-3,000 lbs./acre (air-dry weight). Reference value production is 2,400 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.
