Ecological site R058CY082ND
Choppy Sands

Last updated: 10/31/2018
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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.

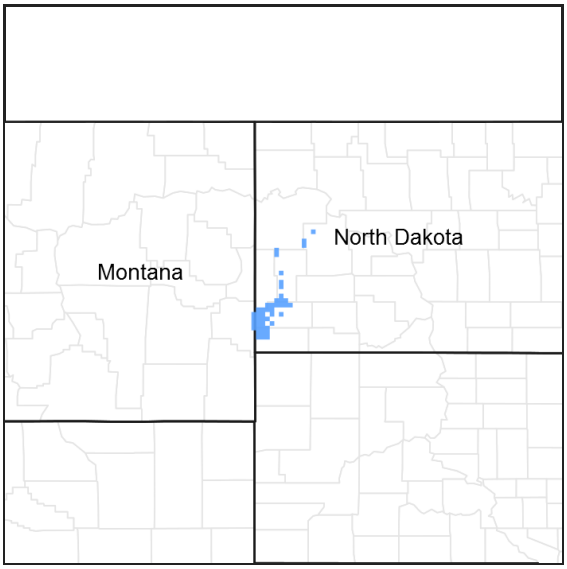


Figure 1. Mapped extent

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.

MLRA notes

Major Land Resource Area (MLRA): 058C–Northern Rolling High Plains, Northeastern Part

MLRA 58C covers 2,780 square miles and encompasses approximately 1.8 million acres. MLRA 58C spans two states with 96% of the area in North Dakota and 4% in Montana. The acreage inside MLRA 58C is 54% privately owned and 44% federal land. The federal land consists of the Fort Berthold Indian Reservation, Little Missouri National Grasslands, and Theodore Roosevelt National Park. MLRA 58C landscape is characterized by steeply sloping, dissected badlands along the Little Missouri River and its tributaries. Tertiary marine shale, siltstone, and sandstone sediments are the most common soil parent materials in this MLRA. Primary land uses are rangeland for grazing and wildlife habitat. Micro-climates inherent in badlands landscapes influence both variety and abundance of vegetation in MLRA 58C. South- and west-facing exposures are dry, hot, and sparsely vegetated. More humid and cooler north- and east-facing exposures are favorable for abundant forage and woody vegetation.

Classification relationships

Major land resource area (MLRA): 058C-Northern Rolling High Plains, Northeastern Part

Ecological site concept

The Choppy Sands ecological site is characterized by sandy soils, generally with greater than 52 percent sand.

Sandy eolian and alluvium sediments make up the parent material of this ecological site. The soil surface is generally less than 3 inches thick, but ranges from 2 to 5 inches. This site occurs on hummocky dunes associated with hillslopes mainly in the southern part of MLRA 58C and on natural levees associated with the floodplain of the Little Missouri River. The slopes are generally less than 15 percent giving a short, steep, hummocky appearance of this site.

Associated sites

R058CY076ND	**Sands** The Sands ecological site is on hillslopes that do not receive additional moisture from runoff. The surface layer of the soil on the hillslopes is typically <12 inches. They are deep or very deep and somewhat excessive to excessively drained, carbonates may or may not be present in the soil solum. The soil textures contain high amounts of sand and will not form a ribbon, but may form a ball when squeezed. This ecological site is on backslopes and footslopes similar to Loamy, Sandy, and Clayey ecological sites. Choppy Sands ecological site are on nearby hummocky dunes on the hillslopes. The Sands site has more production than the Choppy Sands ecological site. Indicator species: sand bluestem and prairie sandreed evenly mixed, some Canada wildrye, penstemon, leadplant, and western snowberry.
R058CY077ND	**Sandy** These are coarse loamy, somewhat excessively to well drained soils on dry hillslopes that do not receive additional moisture from runoff. Soils on Sandy ecological sites are upslope from Sandy Terrace and Loamy Overflow sites, and down slope from Limy Sands and Shallow Sandy sites. Sandy sites are on similar landscape positions as Loamy, Sands, and Clayey ecological sites. The Choppy Sands ecological sites are on nearby hummocky dunes on the hillslopes. Soils on Sandy sites have a high sand content and will make a weak ribbon less than 1 inch long before breaking. The Sandy site has more production then the Choppy Sands ecological site. Indicator species are prairie sandreed with western wheatgrass and green needlegrass intermixed. This site has prairie sandreed and sand bluestem; more needleandthread and sedges, less blue grama, green needlegrass, and western wheatgrass.
R058CY088ND	**Shallow Sandy** The Shallow Sandy ecological site is on hillslopes. The soils on this ecological site have coarse or moderately coarse textures and are somewhat excessively drained. Soft, sandstone bedrock is between 10 inches and 20 inches below the soil surface. The sandstone beds are a root restrictive layer. The soils on Shallow Sandy sites will form a ribbon less than 1 inch long before breaking. The Shallow Sandy ecological site is upslope from the Choppy Sands ecological site. The Shallow Sandy ecological site has slightly less production than the Choppy Sands ecological site due to its position on droughty shoulder slopes of steep hillslope landforms and the presence of a root restrictive layer above twenty inches. Indicator species are little bluestem, prairie sandreed, sand bluestem, and needle grasses, with dotted gayfeather, pasqueflower, purple coneflower, purple prairie clover, and shrubs like prairie rose and yucca.
R058CY089ND	**Sandy Terrace** The Sandy Terrace ecological site has well to excessively drained soils on river or stream terraces that will flood occasionally (once in ten years) to rarely (1 to 5 times in 100 years). These floodplain steps generally have a water table that fluctuates with the depth of the water in the river or stream channel. The soils are very deep and have moderately coarse to coarse textures with stratified layers in the subsoil below the surface layer. These landforms receive periodic deposition from occasional flooding events, so carbonates may or may not be present at or near the surface. The Sandy Terrace sites are typically closer to the associated river or stream and on a similar or slightly lower elevation than the Loamy Terrace. The Sandy Terrace site is down slope from Limy Residual, Badland Fan, Loamy, Sandy, Clayey, and Sands ecological sites. The site is upslope from Saline Lowland and Loamy Overflow ("Riparian Complex") ecological sites. The Choppy Sands ecological site is on nearby hummocky natural levees on floodplains of wind and water worked sediments along the major river system in MLRA 58C. The Sandy Terrace site has more production then the Choppy Sands ecological site. Indicator species are prairie sandreed evenly mixed with sand bluestem, some Canada wildrye, penstemon, and leadplant and/or western snowberry, silver sage, and possibly trees.
R058CY095ND	**Limy Sands** The Limy Sands ecological site occurs on shoulders and backslopes on hillslopes. The soils typically have a thin surface layer which is usually calcareous within 6 inches of the soil surface. The soils on this site typically is moderately deep (20 to 40 inches) to soft, sedimentary bedrock. There is high amounts of sand in the soil and it may not form a ribbon, but may form a ball when squeezed. This site is downslope from Shallow Sandy and upslope or on a similar slope to the Sands and Sandy ecological sites. Choppy Sands ecological site are on nearby hummocky dunes on the hillslopes. Indicator species: Little bluestem, sand bluestem, and prairie sandreed, along with penstemon, silverleaf scurfpea, purple coneflower, yucca, creeping juniper, and leadplant.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

MLRA 58C is known as the Little Missouri Badlands, which formed when the Little Missouri River was diverted along a shorter, steeper course by Pleistocene glaciers. Due to the resulting increased gradient after its eastward diversion by the glaciers, the Little Missouri River began rapidly down cutting into the soft, calcareous sedimentary shale, siltstone, and sandstone of the Fort Union and Hell Creek geological formations. This rapid down cutting eroded and carved the badlands of MLRA 58C. This cycle of erosion and deposition continues today.

Most of the soils in MLRA 58C developed from residuum weathered in place. As a result of constant erosion and deposition, the majority of soils in MLRA 58C are Entisols and Inceptisols. Mollisols have formed on the high, stable drainage divides and plateaus above the steeper, dissected hillslopes and fans that define the Badlands. Elevation ranges from 1,838 feet (560 meters) to 3,430 feet (1,045 meters). The Little Missouri River flows through the entire length of MLRA 58C and empties into Lake Sakakawea that was formed by the Garrison Dam on the Missouri River.

The Choppy Sands ecological site is located on nearly level to hilly sloping dunes associated with sand laden hillslopes and occasionally flooded natural levees along Little Missouri River. A fluctuating water table can occur on the floodplain, depending on the water depth of the Little Missouri River. The surface is typically very hummocky with duned and blown-out areas common. Slopes are complex and have gradients ranging from 0 to 15 percent.

Table 2. Representative physiographic features

Landforms	(1) Dune (2) Natural levee (3) Flood plain
Flooding frequency	None to occasional
Ponding frequency	None
Elevation	1,838–3,430 ft
Slope	0–15%
Ponding depth	0 in
Water table depth	42–72 in
Aspect	Aspect is not a significant factor

Climatic features

MLRA 58C is considered to have a continental climate with cold winters and hot summers, low humidity, light rainfall, and much sunshine. Extremes in temperature are common and characteristic of MLRA 58C. The continental climate is the result of this MLRA's location in the geographic center of North America. There are few natural barriers on the northern Great Plains, so air masses move unobstructed across the plains and account for rapid changes in temperature.

Annual precipitation ranges from 14 to 17 inches per year. The normal average annual temperature is about 41° F. January is the coldest month with an average temperature of about 17° F. July is the warmest month with an average temperature of about 70° F. The range of normal average monthly temperatures between the coldest and warmest months is 53° F. This large temperature range attests to the continental nature of MLRA 58C's climate. Wind speeds average about 11 miles per hour, ranging from about 13 miles per hour during the spring to about 10 miles per hour during the summer. Daytime wind speeds are generally stronger than nighttime wind speeds, and occasional strong storms may bring brief periods of high winds with gusts to more than 50 miles per hour.

Growth of native cool-season plants begins in late March and continues to early to mid-July. Native warm-season

plants begin growth in mid-May and continue to the end of August. Green up of cool-season plants can occur in September and October when adequate soil moisture is present.

Table 3. Representative climatic features

Frost-free period (average)	107 days
Freeze-free period (average)	131 days
Precipitation total (average)	16 in

Climate stations used

- (1) FAIRFIELD [USC00322809], Fairfield, ND
- (2) MEDORA [USC00325813], Medora, ND
- (3) GRASSY BUTTE 2ENE [USC00323705], Grassy Butte, ND
- (4) TROTTERS 3 SSE [USC00328812], Beach, ND
- (5) WATFORD CITY 14S [USC00329246], Grassy Butte, ND

Influencing water features

No significant water features influence this site.

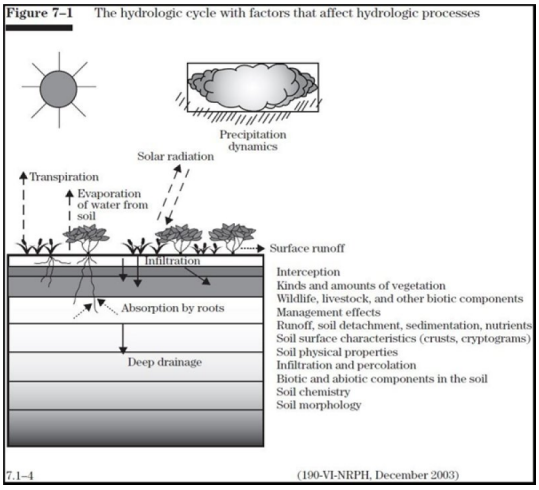


Figure 6. Fig.7-1 from National Range and Pasture Handbook.

Soil features

The common features of soils in this site are the loamy fine sand and fine sand textured subsoils and slopes of 0 to 15 percent. The soils in this site are excessively drained formed in eolian deposits and alluvium. The loamy fine sand or fine sand surface layer ranges from 2 to 5 inches thick.

This site should show slight evidence of wind and water scoured areas or pedestalled plants when in the Reference Plant Community. Water flow paths are not evident in the Reference Plant Community. Due to the sandy nature of this site the soil surface is considered unstable and areas of blow-outs can occur.

These soils are susceptible to water and wind erosion. Loss of the soil surface layer can result in a shift in species composition and/or production.

The major soil series which characterize the Choppy Sands ecological site is Zeona.

The following soil properties listed in the table below represent the soil profile from the surface of the soil to a depth of 40 inches (100 cm).

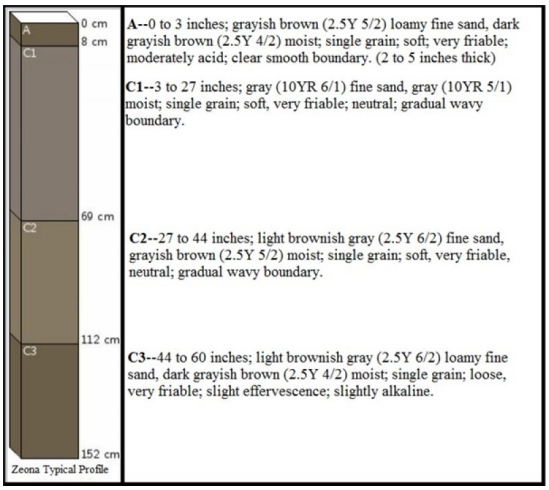


Figure 7. Zeona soil series.

Table 4. Representative soil features

Surface texture	(1) Loamy fine sand (2) Loamy sand (3) Fine sand
Family particle size	(1) Sandy
Drainage class	Excessively drained
Permeability class	Rapid
Soil depth	40–80 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	2–4 in
Calcium carbonate equivalent (0-40in)	0–10%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–5
Soil reaction (1:1 water) (0-40in)	5.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–5%
Subsurface fragment volume >3" (Depth not specified)	0–10%

Ecological dynamics

The site developed under Northern Great Plains climatic conditions, and included natural influence of large herbivores and occasional fire. Changes will occur in the plant communities due to climatic conditions and/or management actions. Due to the nature of the soils, the site is considered quite stable. Under continued adverse impacts, a slow decline in vegetative vigor and composition will occur. Under favorable vegetative management treatments the site can quickly return to the Reference Plant Community.

The plant community upon which interpretations are primarily based is the Reference Plant Community. The Reference Plant Community 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 considered. Subclimax plant communities, states, transitional pathways, and thresholds have been determined through similar studies and experience.

Continuous grazing or continuous seasonal (spring) grazing without adequate recovery opportunities following each grazing event during the growing season will initially cause needleandthread, blue grama, and threadleaf sedge to increase. Species such as sand bluestem and prairie sandreed decrease in frequency and production. Heavy continuous grazing results in an increased amount of threadleaf sedge and forbs, and elimination of sand bluestem, prairie sandreed, and little bluestem.

Non-use (rest) and/or lack of fire will likely cause litter to increase causing decadence, mortality and increased introduced cool-season grasses. Heavy continuous grazing, wildfire, excessive defoliation or any type of physical disturbance can lead to serious erosion problems on these fragile soils (i.e., blowouts).

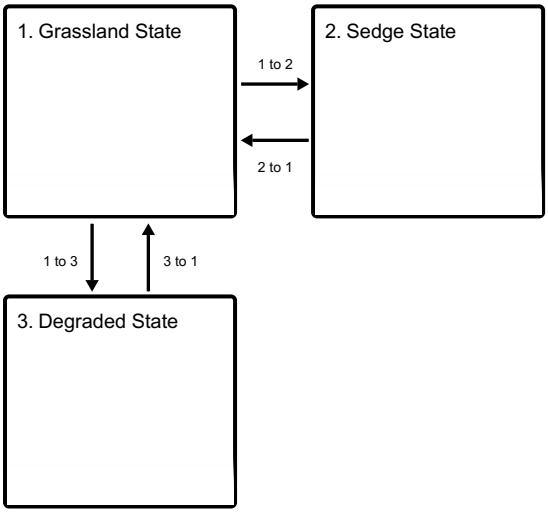
Due to a general invasion of exotic species (such as Kentucky bluegrass and smooth bromegrass) across the MLRA within this site, returning to the 1.1 Sand Bluestem/Prairie Sandreed Plant Community Phase may not be possible.

The following is a diagram that illustrates the common plant communities that can occur on the site and the transition pathways between communities.

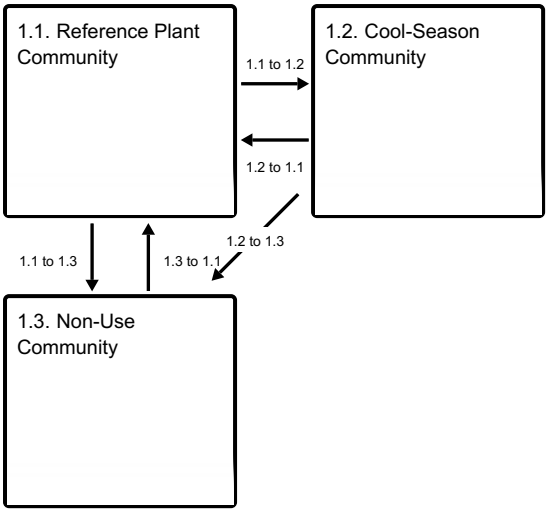
Following the state and transition diagram are narratives for each of the described states and community phases. These may not represent every possibility, but they are the most prevalent and repeatable states/community phases. The plant composition tables shown below have been developed from the best available knowledge at the time of this revision. As more data are collected, some of these community phases and/or states may be revised or removed, and new ones may be added. The main purpose for including the descriptions here is to capture the current knowledge and experience at the time of this revision.

State and transition model

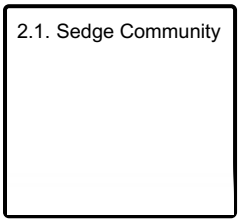
Ecosystem states



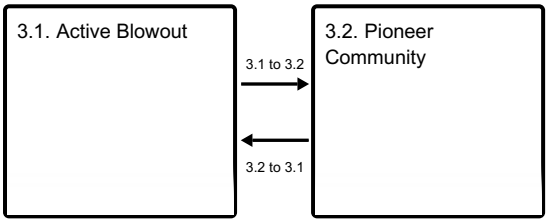
State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 submodel, plant communities



State 1
Grassland State

The Grassland State is supported by empirical data, historical data, local expertise, and photographs. This state is defined by three native plant communities that are a result of periodic fire, drought, and grazing. These events are part of the natural disturbance regime and climatic process. The Reference Plant Community consists of both warm- and cool-season, tall-, mid-, shortgrasses, forbs, and shrubs. The Cool-Season Community is dominated by cool season species with remnant warm-season grasses present. The Non-use plant community consists of decadent plants or excessive litter, and few remnant native grasses and forbs.

Community 1.1
Reference Plant Community

This is the interpretive plant community and is considered to be the Reference Plant Community. This community evolved with grazing by large herbivores and occasional prairie fire. It is well suited for grazing by domestic livestock and can be found on areas that are properly managed with prescribed grazing that allows for proper utilization, changes in season of use and adequate recovery periods following each grazing event. The potential vegetation is about 85% grasses or grass-like plants, 10% forbs, and 5% shrubs. Warm season grasses such as sand bluestem and prairie sandreed dominate the plant community. Other grasses and grass-like plants occurring on the site include needleandthread, blue grama, hairy grama, western wheatgrass, and sedges. Significant forbs include penstemon, green sagewort, stiff sunflower, and spiderwort. Leadplant, rose and yucca are the principal shrubs. 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 off-site and natural plant mortality is very low. The diversity in

plant species allows for high drought tolerance. Waterflow patterns may not be present, but there is a very high risk of wind erosion and eventually blowouts if vegetative cover is not adequate. Cryptogamic crusts can be present, but typically only cover 1-2% of the soil surface. Some pedestalling of plants occurs, but it is not very evident on casual observation and occurs on less than 5% of the plants. Overall this site (the interpretive plant community) has the appearance of being stable and productive.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	715	1140	1450
Forb	60	95	125
Shrub/Vine	25	45	65
Total	**800**	**1280**	**1640**

Community 1.2
Cool-Season Community

This plant community can quickly develop from the adverse effects of long-term, heavy continuous grazing. Sand bluestem and prairie sandreed have been greatly reduced. Needleandthread and threadleaf sedge have increased and are the dominant species. Other grasses include western wheatgrass, blue grama, red threeawn, sand dropseed, Indian Ricegrass, blowout grass, and prairie junegrass. Forbs such as western ragweed, green sagewort, hairy goldaster, lemon scurfpea, and sweetclover may also be present. Yucca, rose, fringed sagewort, and cactus have also increased. Annual production, and consequently litter amounts, have been reduced substantially. Nutrient cycle, water cycle, and energy flow are becoming impaired. This plant community is at risk of losing all tall warm-season grasses. Wind scoured areas may exist where cover has been reduced or eliminated.

Community 1.3
Non-Use Community

This plant community develops after an extended period of 10 or more years of non-use by herbivores or exclusion of fire. Non-native grasses, such as Kentucky bluegrass and cheatgrass tend to invade and may dominate this plant community. Other grasses and grass-likes present include sand bluestem, prairie sandreed, little bluestem, Canada wildrye, western wheatgrass, and threadleaf sedge. The common forbs include green sagewort, goldenrod, western wallflower, prairie coneflower, western ragweed, and sweetclover. Cactus and yucca are the principal shrubs. Litter buildup reduces plant vigor and density, and native seedling recruitment declines. Due to a lack of tiller stimulation and sunlight, native bunchgrasses typically develop dead centers and native rhizomatous grasses are limited to small colonies. This plant community is dispersed throughout the pasture, encircling spot grazed areas, and areas distant from water sources. This is a typical pattern found in properly stocked pastures grazed season-long. This plant community is resistant to change without prescribed grazing or fire. The combination of both grazing and fire is most effective in moving this plant community towards the Reference Plant Community. Soil erosion is low. Runoff is similar to the Reference Plant Community. Once this plant community is reached, time and external resources will be needed to see any immediate recovery in diversity.

Pathway 1.1 to 1.2
Community 1.1 to 1.2

Heavy, continuous grazing or continuous seasonal (spring) grazing will convert the plant community to the Needleandthread/Sedge Plant Community.

Pathway 1.1 to 1.3
Community 1.1 to 1.3

Non-use and no fire for extended periods of time will convert this plant community to the Low Plant Density, Excessive Litter Plant Community.

Pathway 1.2 to 1.1
Community 1.2 to 1.1

Prescribed grazing that includes changing season of use and allowing adequate recovery periods to enhance cool season grasses will lead this plant community back to the Sand Bluestem/Prairie Sandreed Plant Community.

Conservation practices

Prescribed Grazing

Pathway 1.2 to 1.3
Community 1.2 to 1.3

Non-use and no fire over an extended period of time may lead this plant community to the Low Plant Density, Excessive Litter Plant Community.

Pathway 1.3 to 1.1
Community 1.3 to 1.1

Prescribed grazing or prescribed burning followed by prescribed grazing, will move this plant community toward the Sand Bluestem/Prairie Sandreed Plant Community. This would require long-term management with prescribed grazing and/or prescribed burning under controlled conditions.

Conservation practices

Prescribed Burning
Prescribed Grazing

State 2
Sedge State

The Sedge State is supported by empirical data, historical data, local expertise, and photographs. This state represents a plant community change as well as changes to the energy flow and nutrient cycling processes. This state is defined by one plant community. Species diversity and composition has been reduced relative to that of the reference plant community.

Community 2.1
Sedge Community

This plant community developed from heavy continuous grazing without adequate recovery periods between grazing events or continuous seasonal (spring) grazing. An increased amount of threadleaf sedge and forbs characterize this plant community. Sand bluestem and prairie sandreed have been reduced to negligible amounts. Other grasses and grass-likes present include sand dropseed, red threeawn, needleandthread, prairie junegrass, and sandbur. Forbs commonly found in this plant community include green sagewort, lemon scurfpea, western ragweed, buffalo bur, and hairy goldaster. Shrubs present include fringed sagewort and prairie rose. Species diversity has shifted from a grass-dominated community to a forb dominated community. Production has been significantly decreased due to reduction of tall and mid-grass species. Energy flow, water cycle, and mineral cycle have been negatively affected. Litter levels are very low and unevenly distributed. Soil erosion may be a concern on steeper slopes and exposed areas.

State 3
Degraded State

The Degraded State is supported by empirical data, historical data, local expertise, and photographs. This state represents a plant community change as well as changes to the energy flow and nutrient cycling processes. This state is defined by two plant communities.

Community 3.1
Active Blowout

Heavy continuous grazing, excessive defoliation, disturbance (tillage, etc.) and/or wildfire brings about this condition. 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.

Community 3.2
Pioneer Community

This plant community develops under severe disturbance and/or excessive defoliation. This can result from heavy livestock or wildlife concentration, and cropping abandonment (go-back land). The dominant vegetation includes pioneer annual grasses, forbs, invaders, and early successional biennial and perennial species. Grasses may include red threeawn, crested wheatgrass, annual brome, needleandthread, sand dropseed, blowout grass, sandbur, Scribner's Panicum, and little bluestem. The dominant forbs include curlycup gumweed, marestail, salsify, kochia, thistles, western ragweed, pussytoes, prostrate verbena and other early successional species. Shrubs that may be present include prairie rose, fringed sagewort and broom snakeweed. Plant species from adjacent ecological sites may become minor components of this plant community. The community also is susceptible to invasion of non-native species due to severe soil disturbances and relatively high percent of bare ground. Many annual and perennial forbs, including non-native species, have invaded the site. This plant community is resistant to change, as long as soil disturbance or severe vegetation defoliation persists, thus holding back secondary plant succession. Soil erosion is potentially high. Significant economic inputs, management 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.

Pathway 3.1 to 3.2
Community 3.1 to 3.2

Prescribed grazing and concentrated animal impact (such as feeding hay on the blowout), will begin to heal the blowout and provide an opportunity for the Annual/Pioneer Perennial Plant Community to establish.

Pathway 3.2 to 3.1
Community 3.2 to 3.1

Heavy, continuous grazing and/or excessive defoliation will cause this plant community to move toward an Active Blowout condition.

Transition 1 to 2
State 1 to 2

Heavy, continuous grazing and/or continuous seasonal (spring) grazing may cause further deterioration resulting in a shift to the Sedge/Forb Plant Community.

Transition 1 to 3
State 1 to 3

Excessive defoliation (i.e., areas of heavy animal concentration) or cropped go-back land with continuous grazing will convert the plant community to the Annual/Pioneer Perennial Plant Community.

Restoration pathway 2 to 1
State 2 to 1

Long term prescribed grazing with adequate recovery periods following each grazing event and proper stocking over long periods of time move this plant community toward the Needleandthread/Sedge Plant Community.

Eventually the plant community may return to the Reference Plant Community or associated successional plant community stages assuming an adequate seed/vegetative source is available. This process may take greater than 20 years.

Conservation practices

Prescribed Grazing

Restoration pathway 3 to 1
State 3 to 1

Long-term prescribed grazing and removal of disturbance, including adequate rest periods, will move this community through the successional stages, and may eventually lead to a plant community resembling the Sand Bluestem/Prairie Sandreed Plant Community or associated successional plant communities assuming an adequate seed/vegetative source exists. This process will likely take a long period of time (50+ years). Range seeding followed with prescribed grazing can be used to convert this plant community to one that may resemble the Reference Plant Community.

Conservation practices

Prescribed Burning
Prescribed Grazing

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Bluestem**			190–320	
	sand bluestem	ANHA	*Andropogon hallii*	190–320	–
	little bluestem	SCSC	*Schizachyrium scoparium*	0–65	–
2	**Other Native Tall Grasses**			130–255	
	prairie sandreed	CALO	*Calamovilfa longifolia*	130–255	–
3	**Needlegrass**			130–190	
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	130–190	–
4	**Grama**			25–65	
	blue grama	BOGR2	*Bouteloua gracilis*	15–65	–
	hairy grama	BOHI2	*Bouteloua hirsuta*	0–40	–
5	**Other Native Grasses**			65–130	
	western wheatgrass	PASM	*Pascopyrum smithii*	15–25	–
	Fendler threeawn	ARPUL	*Aristida purpurea var. longiseta*	15–25	–
	Canada wildrye	ELCA4	*Elymus canadensis*	15–25	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	15–25	–
	false buffalograss	MUSQ3	*Munroa squarrosa*	0–15	–
	plains reedgrass	CAMO	*Calamagrostis montanensis*	0–15	–
	Scribner's rosette grass	DIOLS	*Dichanthelium oligosanthes var. scribnerianum*	5–15	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	5–15	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	5–15	–
6	**Grass-Likes**			65–130	

6	**Grass-Likes**			65–130	
	threadleaf sedge	CAFI	*Carex filifolia*	65–90	–
	Pennsylvania sedge	CAPE6	*Carex pensylvanica*	25–40	–
	horsetail	EQUIS	*Equisetum*	15–25	–
Forb					
7	**Forbs**			65–130	
	tarragon	ARDR4	*Artemisia dracunculus*	25–40	–
	beardtongue	PENST	*Penstemon*	25–40	–
	longbract spiderwort	TRBR	*Tradescantia bracteata*	25–40	–
	lemon scurfpea	PSLA3	*Psoralidium lanceolatum*	15–25	–
	silky prairie clover	DAVI	*Dalea villosa*	15–25	–
	stiff sunflower	HEPA19	*Helianthus pauciflorus*	15–25	–
	hairy false goldenaster	HEVI4	*Heterotheca villosa*	15–25	–
	blazing star	LIATR	*Liatris*	15–25	–
	rush skeletonplant	LYJU	*Lygodesmia juncea*	15–25	–
	goldenrod	SOLID	*Solidago*	15–25	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	5–15	–
	bractless blazingstar	MENU	*Mentzelia nuda*	0–15	–
	soft-hair marbleseed	ONBEB	*Onosmodium bejariense var. bejariense*	0–15	–
	large Indian breadroot	PEES	*Pediomelum esculentum*	0–15	–
	blacksamson echinacea	ECAN2	*Echinacea angustifolia*	0–15	–
	sanddune wallflower	ERCAC	*Erysimum capitatum var. capitatum*	0–15	–
	buckwheat	ERIOG	*Eriogonum*	0–15	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	0–15	–
	plains milkvetch	ASGI5	*Astragalus gilviflorus*	0–15	–
	wavyleaf thistle	CIUN	*Cirsium undulatum*	0–15	–
Shrub/Vine					
8	**Shrubs**			25–65	
	leadplant	AMCA6	*Amorpha canescens*	25–40	–
	prairie sagewort	ARFR4	*Artemisia frigida*	15–25	–
	rose	ROSA5	*Rosa*	15–25	–
	soapweed yucca	YUGL	*Yucca glauca*	15–25	–
	creeping juniper	JUHO2	*Juniperus horizontalis*	5–15	–
	pricklypear	OPUNT	*Opuntia*	0–15	–
	western sandcherry	PRPUB	*Prunus pumila var. besseyi*	0–15	–

Animal community

Grazing Interpretations:

This site is well adapted to managed grazing by domestic livestock. The predominance of herbaceous plants across all plant community phases best lends these sites to grazing by cattle, but other domestic grazers with differing diet preferences may also be a consideration depending upon management objectives.

Calculating Safe Stocking Rates: Proper stocking rates should be incorporated into a grazing management strategy

that protects the resource, maintains or improves rangeland health, and is consistent with management objectives. In addition to usable forage, safe stocking rates should consider ecological condition, trend of the site, past grazing use history, season of use, stock density, kind and class of livestock, forage digestibility, forage nutritional value, variation of harvest efficiency based on desirability preference of plant species and/or grazing system and site graze ability factors (such as steep slopes, site inaccessibility, or distance to drinking water).

Often the current plant community does not entirely match any particular Community Phase as described in this Ecological Site Description. Because of this, a resource inventory is necessary to document plant composition and production. Proper interpretation of inventory data will permit the establishment of a safe initial stocking rate.

No two years have exactly the same weather conditions. For this reason, year-to-year and season-to season fluctuations in forage production are to be expected on grazing lands. Livestock producers must make timely adjustments in the numbers of animals or in the length of grazing periods to avoid overuse of forage plants when production is unfavorable and to make advantageous adjustments when forage supplies are above average.

Initial stocking rates should be improved through the use of vegetation monitoring and actual use records that include number and type of livestock, the timing and duration of grazing, and utilization levels. Actual use records over time will assist in making stocking rate adjustments based on the variability factors.

Average annual production must be measured or estimated to properly assess useable forage production and stocking rates.

Hydrological functions

Water is the principal factor limiting herbage production on this site. The site is dominated by soils in hydrologic group A. Infiltration varies from rapid to very rapid and runoff potential varies from negligible to very low depending on soil hydrologic group and ground cover. In many cases, areas with greater than 75% ground cover have the greatest potential for high infiltration and lower runoff. Areas where ground cover is less than 50% 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 variety of plants which bloom from spring until fall have an esthetic value that appeals to visitors.

Wood products

No appreciable wood products are present on the site.

Other products

Seed harvest of native plant species can provide additional income on this site.

Other information

Site Development and Testing Plan.

Chris Tecklenburg (Natural Resource Specialist, Ecological Sites, Kansas NRCS) assumed responsibilities for development of provisional ESDs in MLRA 58C on 8-17-2017. Most information for the provisional Choppy Sands ecological site comes from adjacent MLRA 54 Choppy Sands site.

This site is going through the Provisional ESD process. It contains information above and beyond what is required of a provisional due to foundational work completed in adjacent MLRA 54 during the early 2000s. This site is scheduled to go through the approval process fiscal year 2021.

Future work (for approved ESD) includes field visits to verify ecological site concepts with field staff. Field staff include but not limited to project office leader, area soil scientist, state soil scientist, ecological site specialist, state

rangeland conservationist, area rangeland management specialist, and local field personnel. This site should include collaboration between North Dakota and Montana. Field visits are to be determined by spatial extent of the site as well as personal knowledge of the site. Activity during field visits will include but not limited to: identifying the soil, landform, plant community, and verifying existing site concepts. Data collection will be determined by the MLRA 58C technical team.

Inventory data references

Chris Tecklenburg (Natural Resources Specialist, Ecological Sites, Kansas NRCS) was assigned responsibilities for the development of provisional ESDs in MLRA 58C on 8-17-2017.

Information for the provisional Choppy Sands ecological site originates from adjacent MLRA 54 Choppy Sands site.

Information presented here has been derived from NRCS clipping and other inventory data. Also, field knowledge of range-trained personnel was used. All descriptions were peer reviewed and/or field tested by various private, state and federal agency specialist.

NRCS individuals involved in developing MLRA 54 Choppy Sands ecological site description include: Dennis Froemke, Jeff Printz, Stan Boltz, Darrell Vanderbusch, L. Michael Stirling, Josh Saunders, Jody Forman, David Dewald, and Brad Podoll.

SCS-RANGE-417 1 1969 ND Mercer

Other references

High Plains Regional Climate Center, Weather data, web site http://hprcc.unl.edu. Available online. Accessed 9/25/2017.

National Water and Climate Center. https://www.wcc.nrcs.usda.gov/ Available online. Accessed 9/25/2017.

National Range and Pasture Handbook, USDA-NRCS, Chapter 7, Rangeland and Pastureland Hydrology and Erosion. September 1997.

National Soil Information System, USDA-NRCS, Information Technology Center, https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/geo/?cid=nrcs142p2_053552. Available online. Accessed 9/25/2017.

PLANTS Database, USDA-NRCS, http://plants.usda.gov. Available online. Accessed 9/25/2017.

USDA-Natural Resources Conservation Service—Soil Surveys and Web Soil Survey. Available online. Accessed 9/25/2017.

Contributors

Chris Tecklenburg

Approval

David Kraft, 10/31/2018

Acknowledgments

The ecological site development process is a collaborative effort, conceptual in nature, dynamic and is never considered complete.

Non-discrimination Statement

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)	Chris Tecklenburg Revision/Copy of this reference sheet derived from MLRA 54 Choppy Sands on 10/27/2017. J. Printz, S. Boltz, R. Kilian, D. Froemke, M. Rasmusson
Contact for lead author	Mark Hayek, USDA-NRCS, State Rangeland Management Specialist, Bismarck, ND. Mark.Hayek@nd.usda.gov
Date	05/24/2011
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills should not be present.

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2. **Presence of water flow patterns:** Barely observable.

3. **Number and height of erosional pedestals or terracettes:** Barely observable.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground 20 to 25% consisting of randomly scattered small patches no greater than 2 inches in diameter.

5. **Number of gullies and erosion associated with gullies:** Active gullies should not be present. Existing gullies should be “healed” with a good vegetative cover.

6. **Extent of wind scoured, blowouts and/or depositional areas:** Active blowouts should not be present although a few, small, scattered scour sites may be observed. Historic blowouts should be “healed” with a good vegetative cover.

7. **Amount of litter movement (describe size and distance expected to travel):** Little to no plant litter movement. Plant litter remains in place and is not moved by erosional forces.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Plant cover and litter is at 70% or greater of soil surface and maintains soil surface integrity. Stability class anticipated to be greater than 3.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** A--0 to 3 inches; grayish brown (2.5Y 5/2) loamy fine sand, dark grayish brown (2.5Y 4/2) moist; single grain; soft; very friable; moderately acid; clear smooth boundary. (2 to 5 inches thick)

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** High grass canopy and basal cover and small gaps between plants should reduce raindrop impact and slow overland flow, providing increased time for infiltration to occur. Healthy, deep rooted native grasses enhance infiltration and reduce runoff. Infiltration rate is rapid.

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 rhizomatous grasses >

    Sub-dominant: mid and short, cool-season bunchgrasses >

Other: grass-likes = forbs > short, warm-season grasses = shrubs.

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

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Very low.

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14. **Average percent litter cover (%) and depth (in):** Litter cover is in contact with soil surface.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Representative value = 1280 lbs/ac with a range of 800 lbs/ac to 1640 lbs/ac (air dry weight) depending upon growing conditions.

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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, Kentucky bluegrass, smooth bromegrass, creeping juniper.

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17. **Perennial plant reproductive capability:** All species are capable of reproducing.
