

United States Department of Agriculture Natural Resources Conservation Service

Ecological Site Description

Site Type: Rangeland

Site Name: Sands

Site ID: R067BY015CO

Major Land Resource Area: 67B – Central High Plains, Southern Part

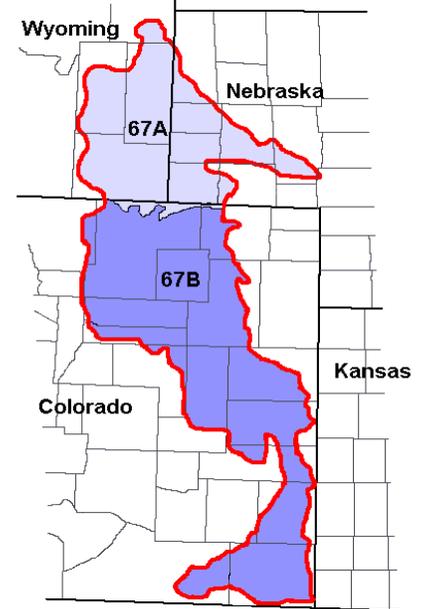
Physiographic Features

This site occurs on nearly level to moderately steep plains and hills. These areas do not have a well defined surface drainage pattern.

Landform: dune, hill, plain

Aspect: N/A

	<u>Minimum</u>	<u>Maximum</u>
Elevation (feet):	3800	5250
Slope (percent):	0	25
Water Table Depth (inches):	60	60
Flooding:		
Frequency:	none	none
Duration:	none	none
Ponding:		
Depth (inches):	0	0
Frequency:	none	none
Duration:	none	none
Runoff Class:	negligible	low



Climatic Features

The mean average annual precipitation varies from 12 to 16 inches per year depending on location and ranges from less than 8 inches to over 20 inches per year. Approximately 75 percent of the annual precipitation occurs during the growing season from mid-April to late-September. Snowfall can vary greatly from year to year but averages 35 to 45 inches per year. Winds are estimated to average about 9 miles per hour annually, ranging from 10 miles per hour during the spring to 9 miles per hour during late summer. Daytime winds are generally stronger than nighttime and occasional strong storms may bring periods of high winds with gusts to more than 90 miles per hour.

The average length of the growing season is 142 days, but varies from 129 to 154 days. The average date of first frost in the fall is September 28 and the last frost in the spring is about May 9. July is the hottest month and December and January are the coldest. It is not uncommon for the temperature to exceed 100 degrees F during the summer. Summer humidity is low and evaporation is high. The winters are characterized with frequent northerly winds, producing severe cold with temperatures dropping to -35 degrees F or lower.

Growth of native cool season plants begins about March 15 and continues to about June 15. Native warm season plants begin growth about May 15 and continue to about August 15. Regrowth of cool season plants may occur in September and October of most years, depending on moisture.

	<u>Minimum</u>	<u>Maximum</u>
Frost-free period (days):	129	154
Freeze-free period (days):	151	178
Mean Annual Precipitation (inches):	12	16

Average Monthly Precipitation (inches) and Temperature (°F):

	Precip. Min.	Precip. Max	Temp. Min.	Temp. Max.
January	0.32	0.36	12.0	45.1
February	0.26	0.38	15.9	50.9
March	0.83	0.87	22.3	58.9
April	1.28	1.38	30.1	69.1
May	2.32	2.49	39.9	78.0
June	1.93	2.57	49.0	88.7
July	1.42	2.31	55.0	93.9
August	1.07	2.38	53.5	91.9
September	1.02	1.40	43.8	83.8
October	0.89	1.00	32.5	72.9
November	0.52	0.53	20.9	57.4
December	0.34	0.37	11.9	46.9

Climate Stations		Period	
Station ID	Location or Name	From	To
CO0945	Briggsdale	1948	2000
CO4076	Holly	1918	2000
CO9147	Windsor	1948	1990

For local climate stations that may be more representative, refer to <http://www.wcc.nrcs.usda.gov>.

Influencing Water Features

Wetland Description:	<u>System</u>	<u>Subsystem</u>	<u>Class</u>	<u>Sub-class</u>
None	None	None	None	None

Stream Type: None

Representative Soil Features

The soils of this site are very deep, excessively to somewhat excessively drained, and are rapidly or very rapidly permeable. These soils occur on sand hills, dunes, and sandy plains. Blowouts occur where the surface has been disturbed. The available water capacity is typically low. The soil surface layer is typically 3 to 20 inches thick and is loamy fine sand, loamy sand, or sandy. The pH is typically neutral to moderately alkaline. The soil moisture regime is ustic aridic. The soil temperature regime is mesic. These soils are susceptible to wind erosion.

The Historic Climax Plant Community (HCPC) should display slight to no evidence of rills. Water flow paths, if present, are broken, irregular in appearance or discontinuous with numerous debris dams or vegetative barriers. Moving sand is inherent to this site. Wind scoured areas may exist in areas. Pedestaled plants caused by wind erosion would be minor. The soil surface is stable and intact. Sub-surface soil layers are non-restrictive to water movement and root penetration. These soils can be susceptible to erosion hazards where vegetative cover is inadequate.

Major soil series correlated to this ecological site include: Bijou (loamy sand), Blakeland, Dailey, Dwyer, Osgood (sand), Truckton (loamy sand), Valent, and Vona (loamy sand).

Other soil series that have been correlated to this site include: none

Parent Material Kind: eolian deposits
Parent Material Origin: mixed
Surface Texture: loamy fine sand, loamy sand, sand
Surface Texture Modifier: none

Subsurface Texture Group: sandy
Surface Fragments $\leq 3''$ (% Cover): 0
Surface Fragments $> 3''$ (%Cover): 0
Subsurface Fragments $\leq 3''$ (% Volume): 0-15
Subsurface Fragments $> 3''$ (% Volume): 0

	<u>Minimum</u>	<u>Maximum</u>
Drainage Class:	somewhat excessively	excessively
Permeability Class:	moderately rapid	very rapid
Depth (inches):	80	80
Electrical Conductivity (mmhos/cm)*:	0	2
Sodium Absorption Ratio*:	0	0
Soil Reaction (1:1 Water)*:	6.1	8.4
Available Water Capacity (inches)*:	3	6
Calcium Carbonate Equivalent (percent)*:	0	15

*These attributes represent 0-40 inches in depth or to the first restrictive layer.

Plant Communities

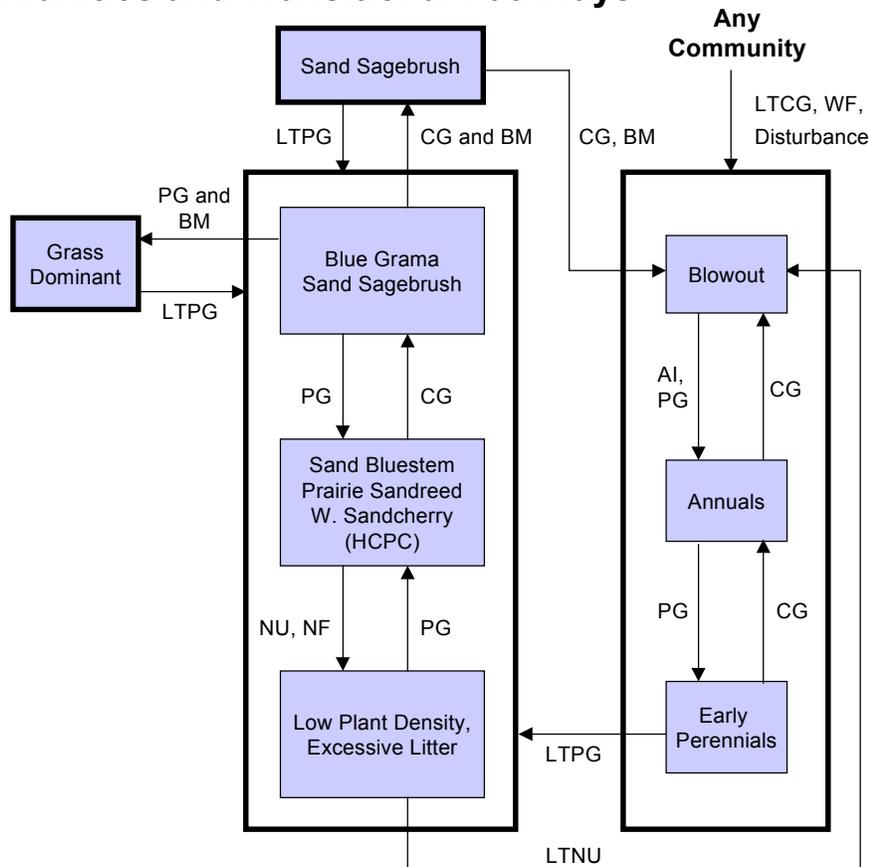
Ecological Dynamics of the Site:

Continuous grazing without adequate recovery opportunities following each grazing event during the growing season will initially cause blue grama and sand sagebrush to increase. Species such as sand bluestem, yellow Indiangrass, switchgrass, prairie sandreed, western sandcherry, leadplant and palatable forbs will decrease in frequency and production. Brush management (spraying) will initially reduce sand sagebrush as well as other forbs and shrubs. Brush management followed by continuous grazing can eliminate remaining grass leaving established or reestablishing sagebrush. Prescribed grazing that allows adequate recovery periods following brush management will result in a grass dominated plant community. Long term non-use, continuous grazing, wildfire, brush management or any type of physical disturbance can lead to serious erosion problems on these fragile soils.

The historic climax plant community (description follows the plant community diagram) has been determined by study of rangeland relic areas, areas protected from excessive disturbance, seasonal use pastures, short duration/time controlled grazing and historical accounts.

The following diagram illustrates the common plant communities that can occur on the site and the transition pathways (arrows) among communities. Bold lines surrounding each plant community or communities represent ecological thresholds. The ecological processes are discussed in more detail in the plant community descriptions following the diagram.

Plant Communities and Transitional Pathways



AI - animal impact, BM - brush management, CG - continuous grazing without adequate recovery period, HCPC - Historic Climax Plant Community, LTCG - long term continuous grazing (>25 yrs), LTNU - long term non-use (>25 yrs), LTPG - long term prescribed grazing (>20 yrs), NF - no fire, NU - non-use, PG - prescribed grazing with adequate recovery period, WF - wildfire

Plant Community Composition and Group Annual Production

COMMON/GROUP NAME	SCIENTIFIC NAME	SYMBOL	Sand Bluestem, Prairie Sandreed, Western Sandcherry (HPC)		
			Group	lbs./acre	% Comp
GRASSES & GRASS-LIKES					
WARM SEASON TALL RHIZOMATOUS GRASS					
prairie sandreed	Calamovilfa longifolia	CALO	1	278 - 370	15 - 20
WARM SEASON TALL BUNCH GRASS					
sand bluestem	Andropogon hallii	ANHA	2	483 - 555	25 - 30
switchgrass	Panicum virgatum	PAV2	2	185 - 370	10 - 20
Indiangrass	Sorghastrum nutans	SONU2	2	93 - 185	5 - 10
WARM SEASON MID RHIZOMATOUS GRASS					
blowout grass	Redfieldia flexuosa	REFL	3	0 - 19	0 - 1
WARM SEASON MID BUNCH GRASS					
little bluestem	Schizachyrium scoparium	SCSC	4	19 - 93	1 - 5
sideoats grama	Bouteloua curtipendula	BOCU	4	0 - 56	0 - 3
sandhill muhly	Muhlenbergia pungens	MUPU2	4	0 - 19	0 - 1
sand dropseed	Sporobolus cryptandrus	SPCR	4	19 - 37	1 - 2
WARM SEASON SHORT BUNCH GRASS					
blue grama	Bouteloua gracilis	BOGR2	5	19 - 93	1 - 5
hairy grama	Bouteloua hirsuta	BOHI	5	19 - 37	1 - 2
COOL SEASON MID RHIZOMATOUS GRASS					
western wheatgrass	Pascopyrum smithii	PASM	6	19 - 37	1 - 2
thickspike wheatgrass	Elymus lanceolatus ssp. lanceolatus	ELLAL	6	0 - 19	0 - 1
COOL SEASON MID BUNCH GRASS					
needleandthread	Hesperostipa comata ssp. comata	HECOC8	7	56 - 130	3 - 7
Indian ricegrass	Achnatherum hymenoides	ACHY	7	19 - 37	1 - 2
bottlebrush squirreltail	Elymus elymoides ssp. elymoides	ELELE	7	0 - 19	0 - 1
prairie junegrass	Koeleria macrantha	KOMA	7	0 - 19	0 - 1
MISCELLANEOUS GRASSES					
red threeawn	Aristida purpurea var. longiseta	ARPUL	8	0 - 19	0 - 1
sand paspalum	Paspalum setaceum	PASE5	8	0 - 19	0 - 1
SEDGES					
sun sedge	Carex inops ssp. heliophila	CAINH2	9	19 - 37	1 - 2
Schweinitz's flatsedge	Cyperus schweinitzii	CYSC3	9	0 - 19	0 - 1
thin stem flatsedge	Cyperus lupulinus	CYLU2	9	0 - 19	0 - 1
OTHER NATIVE GRASSES					
			2GP	0 - 56	0 - 3
FORBS					
LEGUMES					
pacific peavine	Lathyrus polymorphus	LAP02	11	19 - 56	1 - 3
purple prairie clover	Dalea purpurea var. purpurea	DAPUP	11	19 - 37	1 - 2
silky prairie clover	Dalea villosa	DAVI	11	19 - 37	1 - 2
bigtop dalea	Dalea enneandra	DAEN	11	0 - 19	0 - 1
lemon scurfpea	Psoraleidium lanceolatum	PSLA3	11	0 - 19	0 - 1
painted milkvetch	Astragalus ceramicus var. filifolius	ASCEF	11	0 - 19	0 - 1
white prairie clover	Dalea candida	DACA7	11	0 - 19	0 - 1
WARM SEASON					
dotted gayfeather	Liatris punctata	LIPU	12	19 - 37	1 - 2
bush morning-glory	Ipomoea leptophylla	IPLE	12	0 - 19	0 - 1
hairy goldaster	Heterotheca villosa	HEV14	12	0 - 19	0 - 1
heath aster	Symphotrichum ericoides	SYERE	12	0 - 19	0 - 1
Louisiana sagewort	Artemisia ludoviciana	ARLU	12	0 - 19	0 - 1
nuttalls evolvulus	Evolvulus nuttalianus	EVNU	12	0 - 19	0 - 1
othake	Palafoxia sphacelata	PASP	12	0 - 19	0 - 1
pale evening-primrose	Oenothera albicaulis	OEAL	12	0 - 19	0 - 1
snowball sand verbena	Abronia fragrans	ABFR2	12	0 - 19	0 - 1
stiff sunflower	Helianthus pauciflorus ssp. pauciflorus	HEPAP2	12	0 - 19	0 - 1
upright prairie coneflower	Ratibida columnifera	RACO3	12	0 - 19	0 - 1
western ragweed	Ambrosia psilostachya	AMPS	12	0 - 19	0 - 1
COOL SEASON					
narrowleaf penstemon	Penstemon angustifolius	PEAN4	13	19 - 37	1 - 2
deathcarnas	Zigadenus venenosus	ZIVE	13	0 - 19	0 - 1
plains larkspur	Delphinium carolinianum ssp. virescens	DECAV2	13	0 - 19	0 - 1
prairie spiderwort	Tradescantia occidentalis	TROC	13	0 - 19	0 - 1
sand lily	Leucocrinum montanum	LEMO4	13	0 - 19	0 - 1
scarlet globemallow	Sphaeralcea coccinea	SPCO	13	0 - 19	0 - 1
ANNUALS					
annual buckwheat	Eriogonum annuum	ERAN4	14	0 - 19	0 - 1
wooly Indianwheat	Plantago patagonica	PLPA2	14	0 - 19	0 - 1
OTHER NATIVE FORBS					
			2FP	37 - 93	2 - 5
SHRUBS, HALF-SHRUBS, ETC.					
SHRUBS					
western sandcherry	Prunus pumila var. besseyi	PRPUB	16	56 - 185	3 - 10
leadplant	Amorpha canescens	AMCA6	16	37 - 130	2 - 7
sand sagebrush	Artemisia filifolia	ARFI2	16	19 - 93	1 - 5
skunkbrush sumac	Rhus trilobata	RHTR	16	0 - 19	0 - 1
Arkansas rose	Rosa arkansana	ROAR3	16	0 - 19	0 - 1
HALF-SHRUBS					
spreading buckwheat	Eriogonum effusum	EREF	17	0 - 19	0 - 1
Hoods phlox	Phlox hoodii	PHHO	17	0 - 19	0 - 1
SUCCULENTS					
plains pricklypear	Opuntia polyacantha	OPPO	18	0 - 19	0 - 1
purple pincushion	Escobaria vivipara var. vivipara	ESVIV	18	0 - 19	0 - 1
EVERGREEN					
small soapweed	Yucca glauca	YUGL	19	0 - 19	0 - 1
OTHER NATIVE SHRUBS					
			2SHRUB	19 - 56	1 - 3

Annual Production lbs./acre	LOW	RV*	HIGH
GRASSES & GRASS-LIKES	945	1440	1830
FORBS	135	210	285
SHRUBS	120	200	285
TREES			
TOTAL	1200	1850	2400

This list of plants and their relative proportions are based on near normal years. Fluctuations in species composition and relative production may change from year to year dependent upon precipitation or other climatic factors. *RV - Representative Value

Plant Community Narratives

Following are the narratives for each of the described plant communities. These plant communities may not represent every possibility, but they probably are the most prevalent and repeatable plant communities. The plant composition table shown above has been developed from the best available knowledge at the time of this revision. As more data is collected, some of these plant communities may be revised or removed and new ones may be added. None of these plant communities should necessarily be thought of as “Desired Plant Communities”. According to the USDA NRCS National Range and Pasture Handbook, Desired Plant Communities will be determined by the decision makers and will meet minimum quality criteria established by the NRCS. The main purpose for including any description of a plant community here is to capture the current knowledge and experience at the time of this revision.

Sand Bluestem, Prairie Sandreed, Western Sandcherry Plant Community

This is the interpretive plant community and is considered to be the Historic Climax Plant Community (HCPC). This plant community evolved with grazing by large herbivores, is well suited for grazing by domestic livestock and can be found on areas that are properly managed with grazing that allows adequate recovery periods following each grazing occurrence during the growing season.

The historic climax plant community consists chiefly of tall warm season grasses. Principle dominants are sand bluestem, prairie sandreed, switchgrass and yellow Indiangrass. Sub-dominant grasses include needleandthread, blue grama and little bluestem. Significant forbs and shrubs are pacific peavine, evening primrose, prairie clovers, leadplant and western sandcherry. The potential vegetation is about 70-85% grasses and grass-like plants, 8-15% forbs and 7-15% woody plants.

Prescribed grazing that allows for adequate recovery periods after each grazing event and proper stocking will maintain this plant community. Spring grazing and summer deferment will reduce the cool season component of this plant community and increase the warm season component. Spring deferment and summer grazing will increase the cool season component and decrease the warm season component of this plant community.

This plant community is well adapted to the Northern Great Plains climatic conditions and is resistant to many disturbances except continuous grazing, plowing, uncontrolled fire events and urban as well as other land use development. The diversity in plant species allows for high drought tolerance. Plant litter is properly distributed with very little movement off-site and natural plant mortality is very low. This is a sustainable plant community in terms of soil stability, watershed function and biologic integrity.

Production in this community can vary from 1200 to 2400 pounds of air-dry vegetation per acre per year depending on weather conditions and will average 1850 pounds.

The following is an estimated growth curve of this plant community expected during a normal year. Vegetative growth begins earlier in the southern reaches (Baca, Bent, Kiowa, Las Animas and Prowers counties) of MLRA-67B. Vegetative growth will typically be suppressed during the months of June through August in these counties due to higher evapotranspiration rates.

Growth curve number: CO6709

Growth curve name: Warm season dominant, cool season sub-dominant; MLRA-67B; upland coarse textured soils.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	2	7	25	35	15	10	5	1	0	0

(monthly percentages of total annual growth)

Transitions or pathways leading to other plant communities are as follows:

- Continuous grazing without adequate recovery periods between grazing events will move this plant community toward the *Blue grama, Sand Sagebrush Plant Community*. Reduced production and erosion are a concern.
- Non-use and lack of fire will shift this plant community to the *Low Plant Density, Excessive Litter Plant Community*.
- Prescribed grazing that allows for adequate recovery opportunity following each grazing event and proper stocking will maintain the *Sand Bluestem, Prairie Sandreed, Western Sandcherry Plant Community (HCPC)*.

Blue Grama, Sand Sagebrush Plant Community

This plant community evolves with continuous grazing without adequate recovery periods between grazing events during the growing season. Sand bluestem, prairie sandreed, yellow Indiangrass, switchgrass, western sandcherry and leadplant have decreased in frequency and production. Blue grama and sand sagebrush is the dominant species. Sand dropseed, red threeawn, slimflower scurfpea, hairy goldaster, croton, western ragweed, stickleaf, lupine, loco, and milkvetch have also increased.

Spring grazing and summer deferment will reduce the cool season component (needleandthread, western wheatgrass, Indian ricegrass and sedges) of this plant community and increase the warm season component. Spring deferment and summer grazing will increase the cool season component and decrease the warm season component (sand bluestem, prairie sandreed, switchgrass) of this plant community.

This plant community is relatively stable but at risk of losing some of the tall grass species, palatable forbs and shrubs. The reduction of tall grass species, nitrogen-fixing forbs, key shrub component and increased warm season shortgrass has altered the biotic integrity of this plant community. Nutrient cycle, water cycle and energy flow may be impaired. This is an early stage of desertification.

The production varies from 500 to 1300 pounds of air-dry vegetation per acre per year depending on weather conditions and amount of mid and tall grass species still present. Production will average 950 pounds of air-dry vegetation per acre per year.

The following is an estimated growth curve of this plant community expected during a normal year. Vegetative growth begins earlier in the southern reaches (Baca, Bent, Kiowa, Las Animas and Prowers counties) of MLRA-67B. Vegetative growth will typically be suppressed during the months of June through August in these counties due to higher evapotranspiration rates.

Growth curve number: CO6710

Growth curve name: Warm season dominant; MLRA-67B; upland coarse textured soils.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	0	5	20	40	20	10	5	0	0	0

(monthly percentages of total annual growth)

Transitions or pathways leading to other plant communities are as follows:

- Continuous grazing and especially continuous grazing followed by brush management (spraying) will eliminate tall grasses, palatable forbs and shrubs and move this plant community across an ecological threshold to the *Sand Sagebrush Plant Community*. If this management continues long enough, accelerated erosion will occur.
- Brush management (spraying) and prescribed grazing will move this plant community across an ecological threshold toward the *Grass Dominant Plant Community*. Loss of palatable forbs, native legumes and shrubs is a concern.

- Prescribed grazing that allows adequate recovery periods between each grazing event and proper stocking will shift this plant community back to the *Sand Bluestem, Prairie Sandreed, Western Sandcherry Plant Community (HCPC)*.

Low Plant Density, Excessive Litter Plant Community

This plant community occurs when grazing is removed for long periods of time in the absence of fire. Plant composition is similar to the HCPC, however, in time, individual species production and frequency will be lower. Much of the nutrients are tied up in excessive litter. The semiarid environment and the absence of animal traffic to break down litter slows nutrient cycling. Aboveground litter also limits sunlight from reaching plant crowns. Many plants, especially bunchgrasses die off. Thick litter and absence of grazing or fire reduce seed germination and establishment. This plant community will change rapidly with prescribed grazing which allows animal impact and adequate recovery periods between grazing events.

Long term non-use/rest (greater than 25 years), will cause plant decadence and mortality to increase and erosion (blowouts, wind scoured areas) will most likely occur as bare ground increases. Once this happens it will require increased energy input in terms of practice cost and management to bring back.

Production can vary from 100 to 1000 pounds of air-dry vegetation per acre per year depending on weather conditions and the plants that are present.

The following is an estimated growth curve of this plant community expected during a normal year. Vegetative growth begins earlier in the southern reaches (Baca, Bent, Kiowa, Las Animas and Prowers counties) of MLRA-67B. Vegetative growth will typically be suppressed during the months of June through August in these counties due to higher evapotranspiration rates.

Growth curve number: CO6711

Growth curve name: Warm season dominant, cool season sub-dominant, excess litter; MLRA-67B; upland coarse texture soil.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	2	8	20	35	17	10	5	3	0	0

(monthly percentages of total annual growth)

Transitions or pathways leading to other plant communities are as follows:

- Long term non-use or rest will increase in bare ground resulting in *Blowouts*. This transition has crossed an ecological threshold and may take greater than 25 years to develop.
- Prescribed grazing that allows for adequate recovery periods following each grazing event can shift this plant community toward the *Sand Bluestem, Prairie Sandreed, Western Sandcherry Plant Community (HCPC)*. This transition can happen relatively fast.

Sand Sagebrush Plant Community

This plant community is dominated almost entirely with sand sagebrush with little understory species present. Favorable species that remain are few and are protected by the sagebrush. The plant community is created with continuous grazing that does not allow adequate recovery periods between grazing events combined with brush management (spraying) even if it includes one growing season of deferment following spraying. Brush management initially reduces the sagebrush and, unfortunately, eliminates or greatly reduces most if not all other forbs and shrubs. Continuous grazing then reduces and can eliminate the remaining grass to a point where only reestablishing or established sagebrush remains. Further brush spraying at this point eliminates the sand sagebrush, which is the only protection the sandy soil has at this point.

Species diversity and production have dropped substantially. Litter levels are low. Watershed function at this point is greatly reduced. Carbon sequestration is greatly reduced. Nutrient cycle and energy flow has been impaired. Blowouts can form or enlarge rather easily. Flow paths can become connected and runoff is possible during intense storms. Desertification is obvious.

Production can vary from 50 to 1300 pounds of air-dry vegetation (primarily sand sagebrush) per acre per year depending on the amount of sand sagebrush present and weather conditions.

The following is an estimated growth curve of this plant community expected during a normal year. Vegetative growth begins earlier in the southern reaches (Baca, Bent, Kiowa, Las Animas and Prowers counties) of MLRA-67B. Vegetative growth will typically be suppressed during the months of June through August in these counties due to higher evapotranspiration rates.

Growth curve number: CO6710

Growth curve name: Warm season dominant; MLRA-67B; upland coarse textured soils.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	0	5	20	40	20	10	5	0	0	0

(monthly percentages of total annual growth)

Transitions or pathways leading to other plant communities are as follows:

- Continuous grazing and/or brush management will trigger accelerated erosion causing this plant community to form *Blowouts*.
- Long term prescribed grazing that allows adequate recovery periods following each grazing event can move this plant community back to the *Blue Grama Sand Sagebrush Plant Community* and eventually to the *Sand Bluestem, Prairie Sandreed, Western Sandcherry Plant Community (HCPC)* or associate successional plant communities assuming an adequate seed/vegetative source is available. This transition may take greater than 20 years to achieve.

Grass Dominant Plant Community

This plant community develops with brush management (spraying) and prescribed grazing. The brush management not only controls the sand sagebrush but unfortunately removes most if not all of the other forbs and shrubs. The community can vary from predominately sand dropseed and red threeawn to nearly pure stands of prairie sandreed. The species and amounts can vary considerably depending on what was present when the brush management was applied, how long ago it was applied, what kind of prescribed grazing was applied and how long the prescribed grazing was in effect.

There is little plant diversity since most of the forbs and shrubs have been eliminated by brush control efforts. Nutrient and water cycling is impaired due to lack of deep-rooted shrubs and forbs, and native nitrogen fixing legumes. Erosion can vary, depending on production/density of grasses.

Production can vary from 300 to 1700 pounds of air-dry vegetation per acre per year depending on the grass species present, their density, and weather conditions.

The following is an estimated growth curve of this plant community expected during a normal year. Vegetative growth begins earlier in the southern reaches (Baca, Bent, Kiowa, Las Animas and Prowers counties) of MLRA-67B. Vegetative growth will typically be suppressed during the months of June through August in these counties due to higher evapotranspiration rates.

Growth curve number: CO6709

Growth curve name: Warm season dominant, cool season sub-dominant; MLRA-67B; upland coarse textured soils.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	2	7	25	35	15	10	5	1	0	0

(monthly percentages of total annual growth)

Transitions or pathways leading to other plant communities are as follows:

- Long term continuous grazing without adequate recovery periods following each grazing event will eventually trigger accelerated erosion, leading to *Blowouts*.
- Long term prescribed grazing that allows adequate recovery periods following each grazing event (without further brush management) and proper stocking will eventually move this plant community toward the *Sand Bluestem, Prairie Sandreed, Western Sandcherry Plant Community (HCPC)* or associated successional plant community, assuming an adequate seed/vegetative source is available. This transition may take greater than 20 years to achieve.

Blowout

Long term continuous grazing and/or heavy stocking with continuous grazing, 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. Desertification is well advanced.

- Animal impact and prescribed grazing will begin to heal this plant community and move it toward the *Annuals Plant Community*.

Annuals Plant Community

This early succession plant community can either be the result of continuous grazing applied to an early perennial plant community, or the result of controlled short term animal impact and prescribed grazing applied to a blowout. Production can vary greatly depending on the plant density and weather conditions in any year. Cheatgrass, Japanese brome, kochia, Russian thistle, sunflower, pigweed, sixweeks fescue and annual buckwheat are common. Wind erosion is a concern.

Production can vary from 0 to 200 pounds per acre of air-dry vegetation per year.

- Continuous grazing without adequate recovery opportunities, will shift this plant community toward the *Blowout* condition.
- Prescribed grazing that allows adequate recovery periods between grazing events will move this plant community toward the *Early Perennials Plant Community*.

Early Perennials Plant Community

This plant community evolves with continuous grazing from a more advanced plant community or with prescribed grazing from the annuals plant community. Commonly found species include sandhill muhly, blowout grass, Indian ricegrass, Hoods phlox, wormwood sagebrush and lemon scurfpea. Wind erosion continues to be a concern.

Production can vary from 50 to 300 pounds per acre of air-dry vegetation per year.

- Continuous grazing without adequate recovery periods following each grazing event will move this plant community toward the *Annuals Plant Community* and eventually to the *Blowout* condition.
- Long term prescribed grazing that allows adequate recovery periods following each grazing event will eventually move this plant community toward the *Sand Bluestem, Prairie Sandreed, Western Sandcherry Plant Community (HCPC)* or associated successional plant community, assuming an adequate seed/vegetative source is available. This transition may take greater than 20 years to achieve.

Ecological Site Interpretations

Animal Community – Wildlife Interpretations

Sand Bluestem, Prairie Sandreed, Western Sandcherry Plant Community (HCPC)

The structural diversity in the plant community found on the HCPC is attractive to a number of wildlife species. Common bird species expected on the HCPC include Cassin's and Brewer's sparrow, chestnut collared longspur, lark bunting, western meadowlark, and ferruginous and Swainson's hawks. The combination of mid-tall grasses and shrubs provides habitat for greater and lesser prairie chicken in the eastern portions of MLRA-67B. Scaled quail may also use this community.

White-tailed and black-tailed jackrabbit, badger, pronghorn, coyote, swift fox, plains pocket gopher, long-tailed weasel, and several species of mice are mammals that commonly use this plant community. Reptiles using this community include western rattlesnake, bullsnake, plains garter snake western hognose snake, racer, western box turtle, and six-lined racerunner.

Blue Grama, Sand Sagebrush Plant Community

All HCPC species are expected in this plant community, however, the loss of some of the vegetative structural diversity in this plant community make it less attractive to many HCPC species.

Low Density, Excessive Litter and Blowouts Communities

As these communities develop into an open landscape the wildlife species will shift toward the typical shortgrass prairie species such as horned lark, killdeer, long-billed curlew, McCown's longspur, and ferruginous hawk. In addition, mountain plover, and burrowing owl might use these communities where slopes are less than 5%.

Sand Sagebrush Plant Community

Species typically associated with sand sagebrush communities are pronghorn, scaled quail, lesser and greater prairie chicken, mule deer, and Eastern fence lizard.

Grass Dominant Plant Community

This plant community can be quite variable. The wildlife species expected here would be those listed for the plant community most similar to this community.

Annuals and Early Perennials Plant Communities

The presence of tall species such as kochia, pigweed, sunflower, Russian thistle, and others in this community limit use by mountain plover, and other species requiring unobstructed visual distances. Most HCPC species are not expected here in large numbers because of the changes in plant community.

Other Potential Species

The plains spadefoot is the only common species of frog or toad inhabiting grasslands in Eastern Colorado. This species requires water for breeding. Tiger salamanders may be found on grassland sites, but require a water body for breeding. Either of these species may be found in any plant community if seasonal water requirements are met. Mule and white-tailed deer may use this ecological site for feeding, however the shrub cover is too low to provide escape or hiding cover. On ecological site locations near riparian areas, deer will use the vegetation for feeding. Big brown bats will use any plant community on this ecological site if a building site is in the area. The gray wolf, black-footed ferret, and wild bison used this ecological site in historic times. The wolf and ferret are thought to be extirpated from Eastern Colorado. Bison are currently found only as domestic livestock.

Animal Preferences (Quarterly – 1,2,3,4†)

Common Name	Cattle	Sheep	Horses	Deer	Antelope	Bison	Elk
Grasses and Grass-like							
blowout grass	U U D U	N N N N	U U D U	N N N N	N N N N	U U D U	U U D U
blue grama	D P P D	D P P D	D P P D	D P P D	D P P D	D P P D	D P P D
bottlebrush squirreltail	U D U U	U D U U	U D U U	U D U U	U D U U	U D U U	U D U U
hairy grama	U D P U	D P P D	U D P U	D P P D	D P P D	U D P U	U D P U
Indian ricegrass	D P D D	D P D D	D P D D	D P D D	D P D D	D P D D	D P D D
Indiangrass	U D P D	U D U U	U D P D	U D U U	U D U U	U D P D	U D P D
little bluestem	U D P U	N D D N	U D P U	N D D N	N D D N	U D P U	U D P U
needleandthread	U P D D	N D N D	U P D D	N D N D	N D N D	U P D D	U P D D
prairie junegrass	U D U D	N D N U	U D U D	N D N U	N D N U	U D U D	U D U D
prairie sandreed	U D D U	U D U U	U D D U	U D U U	U D U U	U D D U	U D D U
red threeawn	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N
sand bluestem	U D P D	U D U U	U D P D	U D U U	U D U U	U D P D	U D P D
sand dropseed	U D U N	N U D N	U D U N	N U D N	N U D N	U D U N	U D U N
sand paspalum	N U U N	N U N N	N U U N	N U N N	N U N N	N U U N	N U U N
sandhill muhly	N U N N	N N N N	N U N N	N N N N	N N N N	N U N N	N U N N
sideoats grama	U D P U	U D P U	U D P U	U D P U	U D P U	U D P U	U D P U
switchgrass	U D D U	U D U U	U D D U	U D U U	U D U U	U D D U	U D D U
thickspike wheatgrass	U D D U	N D N N	U D D U	N D N N	N D N N	U D D U	U D D U
western wheatgrass	U P D D	U P D D	U P D D	U P D D	U P D D	U P D D	U P D D
Schweinitz's flatsedge	U U U U	U U U U	U U U U	U U U U	U U U U	U U U U	U U U U
sun sedge	U P D D	U P D D	U P D D	U P D D	U P D D	U P D D	U P D D
thinstem flatsedge	U U U U	U U U U	U U U U	U U U U	U U U U	U U U U	U U U U
Forbs							
annual buckwheat	U U U U	N U U N	U U U U	N U U N	N U U N	U U U U	U U U U
bigtop dalea	U D P U	U P P U	U D P U	U P P U	U P P U	U D P U	U D P U
bush morningglory	U D P U	U D D U	U D P U	U D D U	U D D U	U D P U	U D P U
deathcamas	T T T T	T T T T	T T T T	T T T T	T T T T	T T T T	T T T T
dotted gayfeather	U U D U	U D P U	U U D U	U D P U	U D P U	U U D U	U U D U
hairy goldaster	U U D U	N N N N	U U D U	N N N N	N N N N	U U D U	U U D U
heath aster	U U D U	U U P U	U U D U	U U P U	U U P U	U U D U	U U D U
Hood's phlox	U D U U	U P P U	U D U U	U P P U	U P P U	U D U U	U D U U
lemon scurfpea	U U U U	N U U N	U U U U	N U U N	N U U N	U U U U	U U U U
Louisiana sagewort	U U U U	U U D U	U U U U	U U D U	U U D U	U U U U	U U U U
narrowleaf penstemon	U D U U	U P P U	U D U U	U P P U	U P P U	U D U U	U D U U
nuttails evolvulus	U U D U	U D D U	U U D U	U D D U	U D D U	U U D U	U U D U
othake	U U U U	N N N N	U U U U	N N N N	N N N N	U U U U	U U U U
pacific peavine	U D U U	U P P U	U D U U	U P P U	U P P U	U D U U	U D U U
painted milkvetch	U U U U	U D U U	U U U U	U D U U	U D U U	U U U U	U U U U
pale evening-primrose	U U U U	N U U N	U U U U	N U U N	N U U N	U U U U	U U U U
plains larkspur	T T T T	T T T T	T T T T	T T T T	T T T T	T T T T	T T T T
prairie spiderwort	U U U U	N N N N	U U U U	N N N N	N N N N	U U U U	U U U U
purple prairie clover	U P P D	U P P U	U P P D	U P P U	U P P U	U P P D	U P P D
sand lily	U D U U	N U U N	U D U U	N U U N	N U U N	U D U U	U D U U
scarlet globemallow	U D D U	U P P U	U D D U	U P P U	U P P U	U D D U	U D D U
silky prairie clover	U D P U	U P P U	U D P U	U P P U	U P P U	U D P U	U D P U
snowball sand verbena	U U U U	N N N N	U U U U	N N N N	N N N N	U U U U	U U U U
stiff sunflower	U D P U	U D P U	U D P U	U D P U	U D P U	U D P U	U D P U
upright prairie coneflower	U U D U	U P P U	U U D U	U P P U	U P P U	U U D U	U U D U
western ragweed	U D U U	U D U U	U D U U	U D U U	U D U U	U D U U	U D U U
white prairie clover	U D P U	U P P U	U D P U	U P P U	U P P U	U D P U	U D P U
Shrubs							
Arkansas rose	U D D U	U D D U	U D D U	U D D U	U D D U	U D D U	U D D U
leadplant	U P D U	U P D U	U P D U	U P D U	U P D U	U P D U	U P D U
plains pricklypear	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N
purple pincushion	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N	N N N N
sand sagebrush	U N N U	U N N U	U N N U	U N N U	U N N U	U N N U	U N N U
skunkbrush sumac	D U U D	D U U D	D U U D	D U U D	D U U D	D U U D	D U U D
small soapweed	D P N D	D P N D	D P N D	D P N D	D P N D	D P N D	D P N D
spreading buckwheat	U U U U	U U U U	U U U U	U U U U	U U U U	U U U U	U U U U
western sandcherry	D P P D	D U U D	D P P D	D U U D	D U U D	D P P D	D P P D

N = not used; U = undesirable; D = desirable; P = preferred; T = toxic

† Quarters: 1 – Jan., Feb., Mar.; 2 – Apr., May, Jun.; 3 – Jul., Aug., Sep.; 4 – Oct., Nov., Dec.

Animal Community – Grazing Interpretations

The following table lists suggested initial stocking rates for cattle under continuous grazing (year long grazing or growing season long grazing) under normal growing conditions however, *continuous grazing is not recommended*. These are conservative estimates that should be used only as guidelines in the initial stages of the conservation planning process. Often, the current plant composition does not entirely match any particular plant community (described in this ecological site description). Because of this, a field visit is recommended, in all cases, to document plant composition and production. More precise carrying capacity estimates should eventually be calculated using the following stocking rate information along with animal preference data, particularly when grazers other than cattle are involved. Under more intensive grazing management, improved harvest efficiencies can result in an increased carrying capacity.

Plant Community	Production (lbs./acre)	Stocking Rate (AUM/acre)
Sand Bluestem, Prairie Sandreed, Western Sandcherry (HCPC)	1850	0.59
Blue Grama, Sand Sagebrush	950	0.30
Sand Sagebrush	*	*
Grass Dominant	*	*
Low Plant Density, Excessive Litter	*	*

Grazing by domestic livestock is one of the major income-producing industries in the area. Rangelands in this area provide yearlong forage under prescribed grazing for cattle, sheep, horses and other herbivores. During the dormant period, livestock may need supplementation based on reliable forage analysis.

* Highly variable; stocking rate needs to be determined on site.

Hydrology Functions

Water is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group A. Infiltration is high and runoff potential for this site varies from moderate to low depending on ground cover. Areas where ground cover is less than 50% have the greatest potential to have reduced infiltration and higher runoff (refer to NRCS Section 4, National Engineering Handbook (NEH-4) 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 esthetic value that appeals to visitors.

Wood Products

No appreciable wood products are present on the site.

Other Products

None noted.

Supporting Information

Associated Sites

- (067BY021CO) – Choppy Sands
- (067BY024CO) – Sandy (formerly Sandy Plains)

Similar Sites

- (067BY021CO) – Choppy Sands
[steeper slope; less production, more little bluestem]
- (067BY031CO) – Sandy Bottomland
[nearly level to gently sloping, occupies lower landscape position]

Inventory Data References

Information presented here has been derived from NRCS clipping data, numerous ocular estimates and other inventory data. Field observations from experienced range trained personnel were used extensively to develop this ecological site description. Specific data information is contained in individual landowner/user case files and other files located in county NRCS field offices.

Those involved in developing this site include: Harvey Sprock, Rangeland Management Specialist, NRCS; Ben Berlinger, Rangeland Management Specialist, NRCS; Chuck Ring, Rangeland Management Specialist, NRCS; Dave Cook, Rangeland Management Specialist, NRCS; Scott Woodall, Rangeland Management Specialist, NRCS; James Borchert, Soil Scientist, NRCS; Dave Sharman, Resource Conservationist, NRCS; Terri Skadeland, Biologist, NRCS.

State Correlation

This site is specific to Colorado (formerly Deep Sands).

Field Offices

Akron, Brighton, Burlington, Byers, Cheyenne Wells, Eads, Flagler, Fort Morgan, Greeley, Holly, Hugo, Kiowa, Lamar, Longmont, Simla, Springfield, Sterling

Other References

High Plains Regional Climate Center, University of Nebraska, 830728 Chase Hall, Lincoln, NE 68583-0728. (<http://hpccsun.unl.edu>)

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Site Description Approval

/s/

03/25/2004

State Range Management Specialist

Date