

United States Department of Agriculture Natural Resources Conservation Service

Ecological Site Description

Site Type: Rangeland

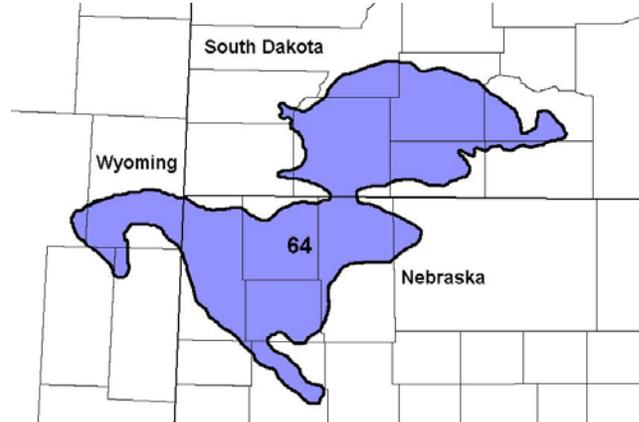
Site Name: Thin Breaks

Site ID: R064XY050NE

Major Land Resource Area: 64 – Mixed Sandy and Silty Tableland

Physiographic Features

This site occurs on steep side slopes of hills.



Landform: hill

Aspect: North to East

	<u>Minimum</u>	<u>Maximum</u>
Elevation (feet):	2900	4000
Slope (percent):	30	80
Water Table Depth (inches):	None	None
Flooding:		
Frequency:	None	None
Duration:	None	None
Ponding:		
Depth (inches):	None	None
Frequency:	None	None
Duration:	None	None
Runoff Class:	Low	Medium

Climatic Features

MLRA 64 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 14 to 20 inches per year. The normal average annual temperature is about 47° F. January is the coldest month with average temperatures ranging from about 21° F (Wood, SD) to about 25° F (Hemingford, NE). July is the warmest month with temperatures averaging from about 70° F (Keeline 3 W, WY) to about 76° F (Wood, SD). The range of normal average monthly temperatures between the coldest and warmest months is about 55° F. This large annual range attests to the continental nature of this area's climate. Hourly winds 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.

	<u>Minimum</u>	<u>Maximum</u>
Frost-free period (days):	138	143
Freeze-free period (days):	161	163
Mean Annual Precipitation (inches):	14	20

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

	Precip. Min.	Precip. Max	Temp. Min.	Temp. Max.
January	0.42	0.52	9.0	35.8
February	0.48	0.61	14.6	40.7
March	0.90	1.22	21.0	47.5
April	1.83	2.15	28.9	61.3
May	2.22	3.38	38.3	72.2
June	2.05	3.27	47.3	82.1
July	1.63	2.73	53.9	90.1
August	1.09	1.96	52.3	89.3
September	1.09	1.58	42.4	79.5
October	0.80	1.38	32.6	66.6
November	0.56	0.65	20.4	49.0
December	0.42	0.50	13.4	38.4

Climate Stations		Period	
Station ID	Location or Name	From	To
NE3755	Hemingford, NE	1964	1999
WY5085	Keeline 3 W, WY	1953	1986
SD9442	Wood, SD	1948	1999

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

Riparian and Wetland Features

No riparian areas or wetland features are directly associated with this site.

Representative Soil Features

The soils in this have very fine sandy loam to silt loam textured surface soils and slopes of 30 to 80 percent. The soils in this site are well to somewhat excessively drained and formed in soft siltstone or sandstone. The very fine sandy loam to silt loam surface layer is 2 to 10 inches thick. The soils have a moderate infiltration rate. This site can show slight to moderate evidence of rills and pedestalled plants. Water flow paths are broken, irregular in appearance or discontinuous with few debris dams or vegetative barriers. The soil surface is relatively stable, however natural erosion is not uncommon on steeper slopes and in areas with sparser vegetation. Sub-surface soil layers are variably restrictive to water movement and root penetration.

These soils are mainly susceptible to water erosion. The hazard of water erosion increases on slopes greater than about 40 percent and on areas with sparse vegetation. The soil-water-plant relationship is strongly influenced by the cooler exposures, and occasional additional moisture supplied by water seepage and springs emanating from rock fissures and soil/rock exposures.

More information can be found in the various soil survey reports. Contact the local USDA Service Center for soil survey reports that include more detail specific to your location.

Parent Material Kind: residuum, colluvium
Parent Material Origin: sedimentary, unspecified
Surface Texture: loam, silt loam, very fine sandy loam
Surface Texture Modifier: none
Subsurface Texture Group: loamy
Surface Fragments $\leq 3''$ (% Cover): 0-10
Surface Fragments $> 3''$ (%Cover): 0-20
Subsurface Fragments $\leq 3''$ (% Volume): 5-45
Subsurface Fragments $> 3''$ (% Volume): 5-25

	<u>Minimum</u>	<u>Maximum</u>
Drainage Class:	well	somewhat excessively
Permeability Class:	moderate	moderately rapid
Depth (inches):	10	40
Electrical Conductivity (mmhos/cm)*:	0	2
Sodium Absorption Ratio*:	0	0
Soil Reaction (1:1 Water)*:	6.6	8.4
Soil Reaction (0.1M CaCl₂)*:	NA	NA
Available Water Capacity (inches)*:	2	5
Calcium Carbonate Equivalent (percent)*:	0	25

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

Plant Communities

Ecological Dynamics of the Site:

This site developed under Northern Great Plains climatic conditions, light to severe grazing/browsing by cervids 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 description describes more typical situations, severe disturbances, such as periods of well-below average precipitation, can cause significant shifts in species composition.

The plant community upon which interpretations are primarily based is the Green Muhly/Bluestem, Shrubs, Trees Plant Community. It has been determined by study of rangeland relic areas which is apparently the current condition of most of where this site occurs.

This site evidently played an important role in the pre-European development of associated woody draw plant communities. During favorable climatic conditions, and the lack of fire in a given area, the woody species which dominate this site would tend to expand into the more favorable soils of the associated overflow sites. With extended dry periods or increased fire activity, the woody species would tend to be eliminated or greatly reduced on overflow sites, but the Thin Breaks site often acts as a refugium for many woody species. It is thought that the current extent of woody draws in the associated overflow sites is largely due to fire suppression efforts post-settlement.

Apparently, this site continues to develop largely through natural climatic cycles, and as a result of plant species that can tolerate cooler conditions and natural plant decadence and mortality. As this site was not previously described, and little information has been collected, only the Green Muhly/Bluestem, Shrubs, Trees Plant Community is characterized at this time. Therefore, no plant community diagram is included here. As more information is collected, and the site studied further, more plant communities may be identified and described.

Plant Community Composition and Group Annual Production

COMMON/GROUP NAME	SCIENTIFIC NAME	SYMBOL	Green Muhly/Bluestem, Shrubs, Trees		
			Group	lbs./acre	% Comp
GRASSES & GRASS-LIKES				1250 - 1750	50 - 70
TALL WARM-SEASON GRASSES			1	250 - 750	10 - 30
green muhly	Muhlenbergia racemosa	MURA	1	125 - 500	5 - 20
big bluestem	Andropogon gerardii	ANGE	1	125 - 250	5 - 10
MID WARM-SEASON GRASSES			2	250 - 500	10 - 20
plains muhly	Muhlenbergia cuspidata	MUCU3	2	125 - 250	5 - 10
sideoats grama	Bouteloua curtipendula	BOCU	2	125 - 250	5 - 10
TALL COOL-SEASON GRASSES			3	250 - 500	10 - 20
Canada wildrye	Elymus canadensis	ELCA4	3	125 - 375	5 - 15
green needlegrass	Nassella viridula	NAV4	3	50 - 250	2 - 10
porcupine grass	Hesperostipa spartea	HESP11	3	0 - 250	0 - 10
OTHER NATIVE GRASSES & GRASS-LIKES			4	125 - 375	5 - 15
western wheatgrass	Pascopyrum smithii	PASM	4	0 - 125	0 - 5
thickspike wheatgrass	Elymus lanceolatus ssp. lanceolatus	ELLAL	4	0 - 125	0 - 5
little bluestem	Schizachyrium scoparium	SCSC	4	25 - 125	1 - 5
prairie sandreed	Calamovilfa longifolia	CALO	4	0 - 125	0 - 5
prairie dropseed	Sporobolus heterolepis	SPHE	4	0 - 125	0 - 5
hairy grama	Bouteloua hirsuta	BOHI2	4	0 - 75	0 - 3
prairie junegrass	Koeleria macrantha	KOMA	4	25 - 75	1 - 3
needleandthread	Hesperostipa comata ssp. comata	HECOC8	4	0 - 125	0 - 5
sedge	Carex spp.	CAREX	4	50 - 125	2 - 5
other perennial grasses		2GP	4	0 - 125	0 - 5
FORBS			5	125 - 250	5 - 10
American pasqueflower	Pulsatilla patens	PUPA5	5	0 - 50	0 - 2
anemone	Anemone spp.	ANEMO	5	0 - 25	0 - 1
catclaw sensitive briar	Mimosa nuttallii	MINU6	5	0 - 25	0 - 1
cinquefoil	Potentilla spp.	POTEN	5	0 - 25	0 - 1
cudweed sagewort	Artemisia ludoviciana	ARLU	5	25 - 75	1 - 3
dotted gayfeather	Liatris punctata	LIPU	5	0 - 50	0 - 2
goldenrod	Solidago spp.	SOLID	5	0 - 75	0 - 3
heath aster	Symphotrichum ericoides	SYER	5	25 - 75	1 - 3
milkvetch	Astragalus spp.	ASTRA	5	25 - 50	1 - 2
northern bedstraw	Galium boreale	GABO2	5	0 - 25	0 - 1
penstemon	Penstemon spp.	PENST	5	0 - 50	0 - 2
prairie smoke	Geum triflorum	GETR	5	0 - 25	0 - 1
purple coneflower	Echinacea angustifolia	ECAN2	5	25 - 75	1 - 3
pussytoes	Antennaria spp.	ANTEN	5	0 - 25	0 - 1
scarlet gaura	Gaura coccinea	GACO5	5	0 - 25	0 - 1
serrate eveningprimrose	Calylophus serrulatus	CASE12	5	0 - 25	0 - 1
star lily	Leucocrocinum montanum	LEMO4	5	0 - 25	0 - 1
starry false Solomon's-seal	Maianthemum stellatum	MAST4	5	0 - 25	0 - 1
other perennial forbs		2FP	5	0 - 75	0 - 3
other annual forbs		2FA	5	0 - 50	0 - 2
SHRUBS			6	125 - 500	5 - 20
American plum	Prunus americana	PRAM	6	25 - 200	1 - 8
cactus	Opuntia spp.	OPUNT	6	0 - 25	0 - 1
chokecherry	Prunus virginiana	PRVI	6	25 - 200	1 - 8
creeping barberry	Mahonia repens	MARE11	6	0 - 25	0 - 1
currant	Ribes spp.	RIBES	6	0 - 125	0 - 5
fringed sagewort	Artemisia frigida	ARFR4	6	25 - 50	1 - 2
poison ivy	Toxicodendron rydbergii	TORY	6	0 - 50	0 - 2
rose	Rosa spp.	ROSA5	6	25 - 75	1 - 3
silver buffaloberry	Shepherdia argentea	SHAR	6	0 - 375	0 - 15
skunkbush sumac	Rhus trilobata	RHTR	6	25 - 250	1 - 10
small soapweed	Yucca glauca	YUGL	6	0 - 50	0 - 2
snowberry	Symphoricarpos spp.	SYMPH	6	0 - 250	0 - 10
other shrubs		2SHRUB	6	0 - 125	0 - 5
TREES			7	125 - 500	5 - 20
American elm	Ulmus americana	ULAM	7	0 - 125	0 - 5
boxelder	Acer negundo	ACNE2	7	0 - 250	0 - 10
bur oak	Quercus macrocarpa	QUMA2	7	0 - 250	0 - 10
eastern redcedar	Juniperus virginiana	JUVI	7	0 - 125	0 - 5
green ash	Fraxinus pennsylvanica	FRPE	7	25 - 375	1 - 15
hackberry	Celtis occidentalis	CEOC	7	0 - 125	0 - 5
ponderosa pine	Pinus ponderosa	PIPO	7	0 - 125	0 - 5
Rocky Mountain juniper	Juniperus scopulorum	JUSC2	7	25 - 250	1 - 10
other trees		2TREE	7	0 - 125	0 - 5

Annual Production lbs./acre	LOW	RV	HIGH
GRASSES & GRASS-LIKES	1440 -	1888	-1825
FORBS	120 -	188	-275
SHRUBS	120 -	313	-550
TREES	120 -	313	-550
TOTAL	1800 -	2500	-3200

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. Refer to PLANTS database for scientific names and codes: <http://plants.usda.gov>

Plant Community and Vegetation State Narratives

Following is the narrative for the described plant community. This plant community may not represent every possibility, but it is the most prevalent and repeatable plant community. The plant composition table shown above has been developed from the best available knowledge at the time of this revision. As more data are collected, this plant community may be revised or new ones may be added. 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.

Green Muhly/Bluestem, Shrubs, Trees Plant Community

Interpretations are based primarily on the Green Muhly/Bluestem, Shrubs, Trees Plant Community (this is also considered to be climax). The potential vegetation is about 50-70% grasses or grass-like plants, 5-10% forbs, 5-20% shrubs and 5-20% trees. Warm season grasses and shrubs dominate the understory of this site, but cool season grasses are also significant. Various combinations of deciduous and coniferous trees can dominate the overstory of this site.

The major grasses include green muhly, big bluestem, Canada wildrye, plains muhly and sideoats grama. Other grasses and grass-likes occurring include green needlegrass, porcupine grass, western wheatgrass, little bluestem, prairie sandreed and sedge. Significant forbs include cudweed sagewort, heath aster, purple coneflower and the South Dakota State Flower, pasqueflower. The most significant shrubs occurring in this plant community include American plum, chokecherry, silver buffaloberry, snowberry, currant and skunkbush sumac. Other shrubs commonly found include rose, yucca and fringed sagewort. Various species of trees will occasionally dominate the plant community, but typically occur in a more scattered fashion. Trees that commonly occur on this plant community include American elm, green ash, Rocky Mountain juniper, bur oak and boxelder. Refer to the plant community composition and group annual production table for species composition and production.

This plant community is extremely resilient and well adapted to the Northern Great Plains climatic conditions. Community dynamics, nutrient cycle, water cycle and energy flow are functioning properly. Plant litter is properly distributed with very little movement off-site; however, litter amounts are often quite high. Natural plant mortality is moderate to high, but the plant species dominating this plant community seem to be adapted to these conditions. The characteristics of the dominant plant species, and the slope aspects allow for high drought tolerance.

The following growth curve shows the estimated monthly percentages of total annual growth of the dominant species expected during an average year:

Growth curve number: NE6404

Growth curve name: Pine Ridge/Badlands, warm-season dominant, cool-season sub-dominant.

Growth curve description: Warm-season dominant, cool-season sub-dominant.

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0	0	5	8	15	24	23	15	5	5	0	0

Ecological Site Interpretations

Animal Community – Wildlife Interpretations

-- Under Development --

Green Muhly/Bluestem, Shrubs, Trees Plant Community:

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

Common Name	Cattle	Sheep	Horses	Deer	Antelope	Bison	Elk
Grasses & Grass-like							
big 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
Canada wildrye	U D U U	N U N N	U D U U	N U N N	N U N N	U D U U	U D U U
green muhly	U D D U	N U N N	U D D U	N U N N	N U N N	U D D U	U D D U
green needlegrass	U P U D	N P N P	U P U D	N P N P	N P N P	U P U D	U P U D
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
little bluestem	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
needleandthread	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
plains muhly	U U D U	U U D U	U U D U	N N N N	N N N N	U U D U	U U D U
porcupine grass	U P U D	N D N U	U P U D	N D N U	N D N U	U P U D	U P U D
prairie dropseed	N U P U	N U D U	N U P U	N U D U	N U D U	N U P U	N U P U
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
sedge	U D U D	U P N D	U D U D	U D U D	U D U D	U D U D	U D U D
sideoats grama	U D P U	U P D U	U D P U	U P D U	U P D U	U D P U	U D P 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 U	N D N N	U P D U	N D N N	N D N N	U P D U	U P D U
Forbs							
American pasqueflower	N N N N	N U N N	N N N N	N U N N	N U N N	N N N N	N N N N
anemone	N N U N	N N U N	N N U N	N N U N	N N U N	N N U N	N N U N
catclaw sensitive briar	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 P P U
cinquefoil	U U D U	U U U U	U U D U	U U U U	U U U U	U U D U	U U U U
cudweed 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 D U
dotted gayfeather	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 P P U
goldenrod	U U D U	N U U N	U U D U	N U U N	N U U N	U U D U	N U U N
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 P U
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 D U U
northern bedstraw	N N N N	N U D N	N N N N	N U D N	N U D N	N N N N	N N N N
penstemon	U U U U	U P P U	U U U U	U P P U	U P P U	U U U U	U P P U
prairie smoke	U U U U	N U U N	U U U U	N U U N	N U U N	U U U U	N U U N
purple 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 P P U
pussytoes	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
scarlet gaura	U U U U	N U U N	U U U U	N U U N	N U U N	U U U U	N U U N
serrate eveningprimrose	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 D P U
star lily	N U N N	N U N N	N U N N	N U N N	N U N N	N U N N	N U N N
starry false Solomon's-seal	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
Shrubs							
American plum	D U U D	D U U D	D U U D	P U D D	D U U D	D U U D	D U U D
cactus	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
chokecherry	D T T D	D T T D	D T T D	P U D P	D U U D	D T T D	P U U P
creeping barberry	N U N U	N N N U	N U N U	N N N U	N N N U	N U N U	N U N U
currant	D U U D	D U U D	D U U D	D U U D	U U U U	D U U D	D U U D
fringed sagewort	U U U U	U U U U	U U U U	U D D U	U P P D	U U U U	U U U D
poison ivy	N N N N	U U U U	N N N N	U U U U	U U U U	N N N N	U U U U
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
silver buffaloberry	D U U U	D U U U	D U U U	P U D P	U U U U	D U U U	D U U U
skunkbush 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 N N D	D U U D	D N N D	D U U D	D U U D	D N N D	D U U D
snowberry	U U U U	U U U U	U U U U	D U D D	U U U U	U U U U	D U U U
Trees							
American elm	N N N N	N N N N	N N N N	N U D N	N N N N	N N N N	N N N N
boxelder	N N N U	N N U U	N N N U	N N U U	N N U U	N N N U	N N U U
bur oak	T T T T	T T T T	N N N U	N U D U	N N N N	T T T T	N U D U
eastern redcedar	U N N U	U N N U	U N N U	D U U D	U N N U	U N N U	U N N U
green ash	N U D U	N D D U	N U D U	N D D U	N U D U	N U D U	N D D U
hackberry	N U D U	N D D U	N U D U	N D D U	N U D U	N U D U	N D D U
ponderosa pine	U T T U	U N N U	U N N U	U N N U	U N N U	U T T U	U N N U
Rocky Mountain juniper	U N N U	U N N U	U N N U	D U U D	U N N U	U N N U	U N N U

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

Due to the steep slopes and the poor accessibility, this site is not likely to receive significant impacts from grazing. Also, this site typically occupies small areas, and would not add tremendously to the forage resources for a grazing management system. Therefore, the available forage on this site would typically not be included when determining the available forage resources for any operating unit. Certainly some use by livestock will occur, but the overall significance would likely be slight.

Hydrology Functions

Water is the principal factor limiting herbage production on this site. The site is dominated by soils in hydrologic group D. Infiltration varies from moderately to high and runoff varies from low to medium depending on slope 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

Local or individual firewood can be utilized from this site. This site has low potential for timber harvest due to steep slopes and variability in site production.

Other Products

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

Supporting Information

Associated Sites

(064XY040NE) – Shallow

(064XY026NE) – Loamy Overflow

(064XY037NE) – Thin Upland

(064XY027NE) – Clayey Overflow

Similar Sites

(064XY026NE) – Loamy Overflow [lesser shrub component; green muhly not dominant]

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: Stan Boltz, Range Management Specialist, NRCS; Jill Epley, Range Management Specialist, NRCS; Rick Peterson, Range Management Specialist, NRCS; David Steffen, Range Management Specialist, NRCS; Jeff Vander Wilt, Range Management Specialist, NRCS; Phil Young, Soil Scientist, NRCS.

<u>Data Source</u>	<u>Number of Records</u>	<u>Sample Period</u>	<u>State</u>	<u>County</u>
SCS-RANGE-417 Ocular estimates	2	2002	SD	Shannon

State Correlation

This site has been correlated with Nebraska, South Dakota and Wyoming in MLRA 64.

Field Offices/Counties

Alliance, NE	Box Butte	Kadoka, SD	Jackson	Rushville, NE	Sheridan
Bridgeport, NE	Morrill	Lusk, WY	Niobrara	Scottsbluff, NE	Scottsbluff
Chadron, NE	Dawes/Sioux	Martin, SD	Bennett/Shannon	Torrington, WY	Goshen
Custer, SD	Custer	Pine Ridge, SD	Pine Ridge IR	Valentine, NE	Cherry
Douglas, WY	Converse	Rapid City, SD	Pennington	Wall, SD	East Pennington
Hot Springs, SD	Fall River	Rosebud, SD	Rosebud IR	Wheatland, WY	Platte
White River, SD	Mellette/Todd				

Relationship to Other Established Classifications

Level IV Ecoregions of the Conterminous United States: 25a – Pine Ridge Escarpment, 43h – White River Badlands, and 43i – Keya Paha Tablelands.

Other References

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

USDA, NRCS. National Water and Climate Center, 101 SW Main, Suite 1600, Portland, OR 97204-3224. (<http://wcc.nrcs.usda.gov>)

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Site Description Approval

NE, State Range Management Specialist

Date

SD, State Range Management Specialist

Date

WY, State Range Management Specialist

Date