

**United States Department of Agriculture
Natural Resources Conservation Service**

Ecological Site Description

Site Type: Rangeland

Site Name: Shallow Loamy

Site ID: R060AY024SD

Major Land Resource Area: 60A – Pierre Shale Plains



Physiographic Features

This site occurs on gently sloping to steep uplands.

Landform: hill, knoll, ridge

Aspect: N/A

| | <u>Minimum</u> | <u>Maximum</u> |
|------------------------------------|----------------|----------------|
| Elevation (feet): | 2500 | 4300 |
| Slope (percent): | 2 | 40 |
| 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: | High | Very high |

Climatic Features

The climate in this MLRA is typical of the drier portions of the Northern Great Plains where sagebrush steppes to the west yield to grassland steppes to the east. Annual precipitation ranges from 13 to 18 inches per year, with most occurring during the growing season. Temperatures show a wide range between summer and winter and between daily maximums and minimums, due to the high elevation and dry air, which permits rapid incoming and outgoing radiation. Cold air masses from Canada in winter move rapidly from northwest to southeast and account for extreme minimum temperatures. Chinook winds may occur in winter and bring rapid rises in temperature. Extreme storms may occur during the winter, but most severely affect ranch operations during late winter and spring. The normal average annual temperature is about 46° F. January is the coldest month with average temperatures ranging from about 19° F (Moorcroft CAA, WY) to about 22° F (Belle Fourche, SD). July is the warmest month with temperatures averaging from about 70° F (Moorcroft CAA, WY) to about 72° F (Belle Fourche, SD). The range of normal average monthly temperatures between the coldest and warmest months is about 51° F. Hourly winds are estimated to average about 11 miles per hour annually, ranging from about 13 miles per hour during the spring to about 10 miles per hour during the summer. Daytime winds are generally stronger than nighttime and occasional strong storms may bring brief periods of high winds with gusts to more than 50 miles per hour.

RANGELAND INTERPRETATIONS

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Growth of cool season plants begins in early to mid March, slowing or ceasing in late June. Warm season plants begin growth about mid May and can continue to early or mid September. 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): | 122 | 129 |
| Freeze-free period (days): | 145 | 152 |
| Mean Annual Precipitation (inches): | 13 | 18 |

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

| | Precip. Min. | Precip. Max | Temp. Min. | Temp. Max. |
|-----------|--------------|-------------|------------|------------|
| January | 0.32 | 0.43 | 7.1 | 34.1 |
| February | 0.44 | 0.57 | 12.6 | 40.1 |
| March | 0.65 | 0.94 | 19.7 | 46.5 |
| April | 1.43 | 1.72 | 29.4 | 60.2 |
| May | 2.45 | 3.19 | 39.7 | 70.6 |
| June | 2.34 | 3.38 | 48.5 | 80.1 |
| July | 1.60 | 2.78 | 54.8 | 88.0 |
| August | 1.24 | 1.76 | 53.1 | 87.7 |
| September | 1.01 | 1.50 | 42.3 | 77.0 |
| October | 0.90 | 1.11 | 31.4 | 64.9 |
| November | 0.40 | 0.61 | 19.8 | 47.5 |
| December | 0.40 | 0.48 | 10.2 | 38.0 |

| Climate Stations | | Period | |
|------------------|------------------|--------|------|
| Station ID | Location or Name | From | To |
| SD0236 | Ardmore 2 N | 1948 | 1999 |
| SD0559 | Belle Fourche | 1948 | 1999 |
| SD1124 | Buffalo Gap | 1951 | 1999 |
| WY6395 | Moorcroft CAA | 1948 | 1998 |
| WY9207 | Upton 13 SW | 1949 | 1998 |

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

Influencing Water Features

No significant water features influence this site.

Representative Soil Features

The soils in this site are well to somewhat excessively drained and formed in soft siltstone, sandstone, mudstone or shale. The loam to clay loam surface layer is 2 to 9 inches thick. The soils have a moderate infiltration rate. This site should show slight to no evidence of rills, wind scoured areas or pedestalled plants. Water flow paths are broken, irregular in appearance or discontinuous with numerous debris dams or vegetative barriers. The soil surface is stable and intact. Sub-surface soil layers are 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 15 percent. Very low to low available water capacity caused by the shallow rooting depth strongly influences the soil-water-plant relationship.

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, silty clay 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): 0-15
Subsurface Fragments $> 3''$ (% Volume): 0

| | <u>Minimum</u> | <u>Maximum</u> |
|---|-----------------|----------------------|
| Drainage Class: | well | somewhat excessively |
| Permeability Class: | moderately slow | moderate |
| Depth (inches): | 10 | 20 |
| Electrical Conductivity (mmhos/cm)*: | 0 | 8 |
| Sodium Absorption Ratio*: | 0 | 5 |
| Soil Reaction (1:1 Water)*: | 6.6 | 9.0 |
| Soil Reaction (0.1M CaCl₂)*: | NA | NA |
| Available Water Capacity (inches)*: | 2 | 3 |
| Calcium Carbonate Equivalent (percent)*: | 0 | 40 |

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

Plant Communities

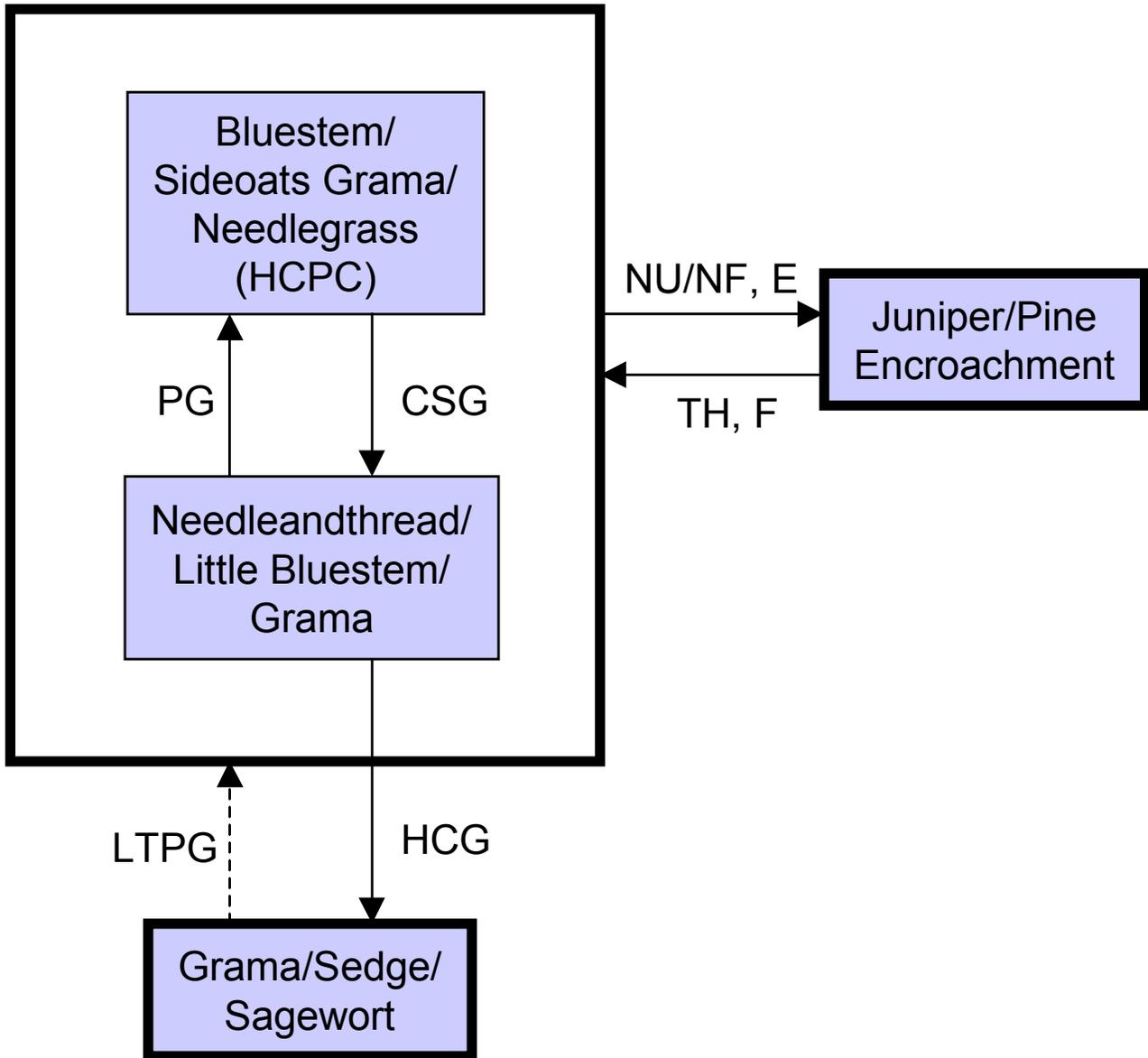
Ecological Dynamics of the Site:

This site developed under Northern Great Plains climatic conditions, natural influences of large herbivores, occasional fire, and other biotic and abiotic factors that typically influence soil/site development. Changes will occur in the plant communities due to short-term weather variations, impacts of native and/or exotic plant and animal species, and management actions. While the following plant community descriptions describe more typical transitions between communities that will occur, severe disturbances, such as periods of well-below average precipitation, can cause significant shifts in plant communities and/or species composition.

The plant community upon which interpretations are primarily based is the Historic Climax Plant Community (HCPC). The HCPC has been determined by studying rangeland relic areas, areas protected from excessive disturbance, and areas under long-term rotational grazing regimes. Trends in plant community dynamics ranging from heavily grazed to lightly grazed areas, seasonal use pastures, and historical accounts also have been used. Plant communities, states, transitional pathways, and thresholds have been determined through similar studies and experience.

The following is a diagram that illustrates the common plant communities that can occur on the site and the transition pathways between communities. The ecological processes are discussed in more detail in the plant community descriptions following the diagram.

Plant Communities and Transitional Pathways



CSG - continuous seasonal grazing; **E** - encroachment; **F** - fire;
HCG - heavy continuous grazing; **HCPC** - Historical Climax Plant Community; **LTPG** - long-term prescribed grazing; **NU/NF** - non-use, no fire for extended periods; **PG** - prescribed grazing; **TH** - thinning.

Plant Community Composition and Group Annual Production

| COMMON/GROUP NAME | SCIENTIFIC NAME | SYMBOL | Bluestem/Sideoats Grama/ Needlegrass (HCPC) | | |
|---|--|--------|--|-----------------|---------------|
| | | | Group | lbs./acre | % Comp |
| GRASSES & GRASS-LIKES | | | | 1120 - 1260 | 80 - 90 |
| big bluestem | Andropogon gerardii | ANGE | 1 | 28 - 140 | 2 - 10 |
| little bluestem | Schizachyrium scoparium | SCSC | 2 | 70 - 280 | 5 - 20 |
| sideoats grama | Bouteloua curtipendula | BOCU | 3 | 140 - 280 | 10 - 20 |
| western wheatgrass | Pascopyrum smithii | PASM | 4 | 0 - 210 | 0 - 15 |
| NEEDLEGRASSES | | | 5 | 70 - 280 | 5 - 20 |
| needleandthread | Hesperostipa comata ssp. comata | HECOC8 | 5 | 70 - 210 | 5 - 15 |
| green needlegrass | Nassella viridula | NAVI4 | 5 | 0 - 70 | 0 - 5 |
| SHORT WARM-SEASON GRASSES | | | 6 | 70 - 280 | 5 - 20 |
| blue grama | Bouteloua gracilis | BOGR2 | 6 | 70 - 210 | 5 - 15 |
| hairy grama | Bouteloua hirsuta | BOHI2 | 6 | 0 - 140 | 0 - 10 |
| buffalograss | Buchloe dactyloides | BUDA | 6 | 0 - 70 | 0 - 5 |
| NATIVE GRASSES & GRASS-LIKES | | | 7 | 70 - 280 | 5 - 20 |
| sedge | Carex spp. | CAREX | 7 | 70 - 140 | 5 - 10 |
| plains muhly | Muhlenbergia cuspidata | MUCU3 | 7 | 0 - 70 | 0 - 5 |
| prairie junegrass | Koeleria macrantha | KOMA | 7 | 0 - 42 | 0 - 3 |
| prairie sandreed | Calamovilfa longifolia | CALO | 7 | 0 - 140 | 0 - 10 |
| other perennial grasses | | ZGP | 7 | 0 - 140 | 0 - 10 |
| FORBS | | | 9 | 70 - 140 | 5 - 10 |
| American vetch | Vicia americana | VIAM | 9 | 0 - 28 | 0 - 2 |
| cudweed sagewort | Artemisia ludoviciana | ARLU | 9 | 14 - 42 | 1 - 3 |
| dalea | Dalea spp. | DALEA | 9 | 0 - 28 | 0 - 2 |
| deervetch | Lotus unifoliolatus var. unifoliolatus | LOUNU | 9 | 0 - 28 | 0 - 2 |
| dotted gayfeather | Liatri punctata | LIPU | 9 | 14 - 70 | 1 - 5 |
| erigonum | Eriogonum spp. | ERIOG | 9 | 0 - 28 | 0 - 2 |
| false boneset | Brickellia eupatorioides | BREU | 9 | 0 - 28 | 0 - 2 |
| goldenrod | Solidago spp. | SOLID | 9 | 14 - 42 | 1 - 3 |
| hairy goldaster | Heterotheca villosa | HEVI4 | 9 | 0 - 28 | 0 - 2 |
| heath aster | Symphotrichum ericoides | SYER | 9 | 0 - 28 | 0 - 2 |
| Indian breadroot | Pediomelum esculentum | PEES | 9 | 14 - 70 | 1 - 5 |
| milkvetch | Astragalus spp. | ASTRA | 9 | 0 - 42 | 0 - 3 |
| penstemon | Penstemon spp. | PENST | 9 | 0 - 28 | 0 - 2 |
| prairie coneflower | Ratibida columnifera | RACO3 | 9 | 0 - 42 | 0 - 3 |
| purple coneflower | Echinacea angustifolia | ECAN2 | 9 | 42 - 70 | 3 - 5 |
| purple prairie clover | Dalea purpurea | DAPU5 | 9 | 42 - 70 | 3 - 5 |
| pussytoes | Antennaria spp. | ANTEN | 9 | 14 - 28 | 1 - 2 |
| scarlet gaura | Gaura coccinea | GACO5 | 9 | 14 - 28 | 1 - 2 |
| scarlet globemallow | Sphaeralcea coccinea | SPCO | 9 | 14 - 28 | 1 - 2 |
| scurfpea | Psoralegium spp. | PSORA2 | 9 | 14 - 70 | 1 - 5 |
| spiny phlox | Phlox hoodii | PHHO | 9 | 0 - 42 | 0 - 3 |
| stemless hymenoxys | Tetranneuris acaulis | TEAC | 9 | 0 - 14 | 0 - 1 |
| stiff sunflower | Helianthus pauciflorus | HEPA19 | 9 | 14 - 42 | 1 - 3 |
| western ragweed | Ambrosia psilostachya | AMPS | 9 | 0 - 14 | 0 - 1 |
| western yarrow | Achillea millefolium | ACMI2 | 9 | 0 - 28 | 0 - 2 |
| other perennial forbs | | ZFP | 9 | 0 - 28 | 0 - 2 |
| SHRUBS | | | 10 | 28 - 140 | 2 - 10 |
| big sagebrush | Artemisia tridentata | ARTR2 | 10 | 0 - 70 | 0 - 5 |
| cactus | Opuntia spp. | OPUNT | 10 | 0 - 28 | 0 - 2 |
| creeping juniper | Juniperus horizontalis | JUHO2 | 10 | 0 - 70 | 0 - 5 |
| fringed sagewort | Artemisia frigida | ARFR4 | 10 | 14 - 70 | 1 - 5 |
| leadplant | Amorpha canescens | AMCA6 | 10 | 0 - 70 | 0 - 5 |
| rose | Rosa spp. | ROSA5 | 10 | 0 - 70 | 0 - 5 |
| saltbush | Atriplex spp. | ATRIP | 10 | 0 - 70 | 0 - 5 |
| skunkbush sumac | Rhus trilobata | RHTR | 10 | 0 - 70 | 0 - 5 |
| winterfat | Krascheninnikovia lanata | KRLA2 | 10 | 0 - 70 | 0 - 5 |
| yucca | Yucca glauca | YUGL | 10 | 0 - 28 | 0 - 2 |
| other shrubs | | ZSHRUB | 10 | 0 - 70 | 0 - 5 |
| TREES | | | 11 | 0 - 14 | 0 - 1 |
| juniper | Juniperus spp. | JUNIP | 11 | 0 - 14 | 0 - 1 |
| ponderosa pine | Pinus ponderosa | PIPO | 11 | 0 - 14 | 0 - 1 |

| Annual Production lbs./acre | | LOW | RV | HIGH |
|----------------------------------|--|-------|------|--------|
| GRASSES & GRASS-LIKES | | 810 - | 1204 | - 1595 |
| FORBS | | 65 - | 105 | - 145 |
| SHRUBS | | 25 - | 84 | - 145 |
| TREES | | 0 - | 7 | - 15 |
| TOTAL | | 900 - | 1400 | - 1900 |

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 Composition and Group Annual Production

| COMMON/GROUP NAME | SYMBOL | Bluestem/Sideoats Grama/ Needlegrass (HCPC) | | | Needleandthread/Little Bluestem/Grama | | | Blue Grama/Sedge/ Sagewort | | | Juniper/Pine Encroachment | | | |
|---|--------|--|-----------------|---------------|--|------------------|----------------|-------------------------------|------------------|----------------|------------------------------|-----------------|---------------|-------------|
| | | Grp | lbs./acre | % Comp | Grp | lbs./acre | % Comp | Grp | lbs./acre | % Comp | Grp | lbs./acre | % Comp | |
| GRASSES & GRASS-LIKES | | | 1120 - 1260 | 80 - 90 | | 700 - 850 | 70 - 85 | | 300 - 400 | 60 - 80 | | 720 - 1020 | 60 - 85 | |
| big bluestem | ANGE | 1 | 28 - 140 | 2 - 10 | 1 | 10 - 50 | 1 - 5 | 1 | | | 1 | 0 - 60 | 0 - 5 | |
| little bluestem | SCSC | 2 | 70 - 280 | 5 - 20 | 2 | 100 - 250 | 10 - 25 | 2 | 0 - 25 | 0 - 5 | 2 | 0 - 120 | 0 - 10 | |
| sideoats grama | BOCU | 3 | 140 - 280 | 10 - 20 | 3 | 50 - 150 | 5 - 15 | 3 | 0 - 50 | 0 - 10 | 3 | 60 - 180 | 5 - 15 | |
| western wheatgrass | PASM | 4 | 0 - 210 | 0 - 15 | 4 | 0 - 100 | 0 - 10 | 4 | 0 - 25 | 0 - 5 | 4 | 0 - 180 | 0 - 15 | |
| NEEDLEGRASSES | | 5 | 70 - 280 | 5 - 20 | 5 | 100 - 250 | 10 - 25 | 5 | 25 - 75 | 5 - 15 | 5 | 60 - 180 | 5 - 15 | |
| needleandthread | HECOC8 | 5 | 70 - 210 | 5 - 15 | 5 | 100 - 250 | 10 - 25 | 5 | 25 - 75 | 5 - 15 | 5 | 60 - 180 | 5 - 15 | |
| green needlegrass | NAVI4 | 5 | 0 - 70 | 0 - 5 | 5 | 0 - 30 | 0 - 3 | | | | 5 | 0 - 60 | 0 - 5 | |
| SHORT WARM-SEASON GRASSES | | 6 | 70 - 280 | 5 - 20 | 6 | 150 - 350 | 15 - 35 | 6 | 100 - 225 | 20 - 45 | 6 | 60 - 240 | 5 - 20 | |
| blue grama | BOGR2 | 6 | 70 - 210 | 5 - 15 | 6 | 100 - 200 | 10 - 20 | 6 | 75 - 150 | 15 - 30 | 6 | 60 - 180 | 5 - 15 | |
| hairy grama | BOHI2 | 6 | 0 - 140 | 0 - 10 | 6 | 50 - 150 | 5 - 15 | 6 | 25 - 75 | 5 - 15 | 6 | 0 - 120 | 0 - 10 | |
| buffalograss | BUDA | 6 | 0 - 70 | 0 - 5 | 6 | 0 - 50 | 0 - 5 | 6 | 0 - 50 | 0 - 10 | 6 | 0 - 60 | 0 - 5 | |
| NATIVE GRASSES & GRASS-LIKES | | 7 | 70 - 280 | 5 - 20 | 7 | 100 - 300 | 10 - 30 | 7 | 75 - 225 | 15 - 45 | 7 | 60 - 180 | 5 - 15 | |
| sedge | CAREX | 7 | 70 - 140 | 5 - 10 | 7 | 100 - 200 | 10 - 20 | 7 | 75 - 150 | 15 - 30 | 7 | 60 - 180 | 5 - 15 | |
| plains muhly | MUCU3 | 7 | 0 - 70 | 0 - 5 | 7 | 0 - 50 | 0 - 5 | | | | 7 | 0 - 60 | 0 - 5 | |
| prairie junegrass | KOMA | 7 | 0 - 42 | 0 - 3 | 7 | 0 - 50 | 0 - 5 | 7 | 0 - 50 | 0 - 10 | 7 | 0 - 60 | 0 - 5 | |
| prairie sandreed | CALO | 7 | 0 - 140 | 0 - 10 | 7 | 0 - 100 | 0 - 10 | 7 | 0 - 15 | 0 - 3 | 7 | 0 - 60 | 0 - 5 | |
| threawn | ARIST | | | | | | | 7 | 10 - 50 | 2 - 10 | 7 | 0 - 60 | 0 - 5 | |
| sand dropseed | SPCR | | | | | | | 7 | 10 - 50 | 2 - 10 | 7 | 0 - 60 | 0 - 5 | |
| other perennial grasses | ZGP | 7 | 0 - 140 | 0 - 10 | 7 | 0 - 100 | 0 - 10 | 7 | 0 - 50 | 0 - 10 | 7 | 0 - 120 | 0 - 10 | |
| NON-NATIVE GRASSES | | 8 | | | 8 | 0 - 50 | 0 - 5 | 8 | 10 - 50 | 2 - 10 | 8 | 0 - 120 | 0 - 10 | |
| cheatgrass | BRTE | | | | 8 | 0 - 30 | 0 - 3 | 8 | 10 - 40 | 2 - 8 | 8 | 0 - 120 | 0 - 10 | |
| Kentucky bluegrass | POPR | | | | 8 | 0 - 50 | 0 - 5 | 8 | 0 - 40 | 0 - 8 | 8 | 0 - 120 | 0 - 10 | |
| FORBS | | 9 | 70 - 140 | 5 - 10 | 9 | 100 - 150 | 10 - 15 | 9 | 25 - 100 | 5 - 20 | 9 | 60 - 120 | 5 - 10 | |
| American vetch | VIAM | 9 | 0 - 28 | 0 - 2 | 9 | 10 - 50 | 1 - 5 | 9 | 5 - 25 | 1 - 5 | 9 | 0 - 24 | 0 - 2 | |
| cudweed sagewort | ARLU | 9 | 14 - 42 | 1 - 3 | 9 | 20 - 70 | 2 - 7 | 9 | 25 - 50 | 5 - 10 | 9 | 12 - 36 | 1 - 3 | |
| dalea | DALEA | 9 | 0 - 28 | 0 - 2 | 9 | 0 - 20 | 0 - 2 | 9 | 0 - 10 | 0 - 2 | 9 | 0 - 24 | 0 - 2 | |
| deervetch | LOUNU | 9 | 0 - 28 | 0 - 2 | 9 | 10 - 50 | 1 - 5 | 9 | 5 - 25 | 1 - 5 | 9 | 0 - 24 | 0 - 2 | |
| dotted gayfeather | LIPU | 9 | 14 - 70 | 1 - 5 | 9 | 20 - 70 | 2 - 7 | 9 | 25 - 50 | 5 - 10 | 9 | 12 - 60 | 1 - 5 | |
| erigonum | ERIOG | 9 | 0 - 28 | 0 - 2 | 9 | 10 - 50 | 1 - 5 | 9 | 5 - 25 | 1 - 5 | 9 | 0 - 24 | 0 - 2 | |
| false boneset | BREU | 9 | 0 - 28 | 0 - 2 | 9 | 0 - 20 | 0 - 2 | | | | 9 | 0 - 24 | 0 - 2 | |
| goldenrod | SOLID | 9 | 14 - 42 | 1 - 3 | 9 | 20 - 50 | 2 - 5 | 9 | 15 - 35 | 3 - 7 | 9 | 12 - 36 | 1 - 3 | |
| hairy goldaster | HEVI4 | 9 | 0 - 28 | 0 - 2 | 9 | 10 - 50 | 1 - 5 | 9 | 10 - 35 | 2 - 7 | 9 | 0 - 24 | 0 - 2 | |
| heath aster | SYER | 9 | 0 - 28 | 0 - 2 | 9 | 10 - 50 | 1 - 5 | 9 | 15 - 35 | 3 - 7 | 9 | 0 - 24 | 0 - 2 | |
| Indian breadroot | PEES | 9 | 14 - 70 | 1 - 5 | 9 | 10 - 30 | 1 - 3 | | | | 9 | 12 - 60 | 1 - 5 | |
| milkvetch | ASTRA | 9 | 0 - 42 | 0 - 3 | 9 | 0 - 30 | 0 - 3 | 9 | 15 - 25 | 3 - 5 | 9 | 0 - 36 | 0 - 3 | |
| penstemon | PENST | 9 | 0 - 28 | 0 - 2 | 9 | 0 - 20 | 0 - 2 | 9 | 0 - 10 | 0 - 2 | 9 | 0 - 24 | 0 - 2 | |
| prairie coneflower | RACO3 | 9 | 0 - 42 | 0 - 3 | 9 | 0 - 30 | 0 - 3 | 9 | 15 - 25 | 3 - 5 | 9 | 0 - 36 | 0 - 3 | |
| purple coneflower | ECAN2 | 9 | 42 - 70 | 3 - 5 | 9 | 30 - 50 | 3 - 5 | 9 | 15 - 25 | 3 - 5 | 9 | 36 - 60 | 3 - 5 | |
| purple prairie clover | DAPU5 | 9 | 42 - 70 | 3 - 5 | 9 | 30 - 50 | 3 - 5 | 9 | 15 - 25 | 3 - 5 | 9 | 36 - 60 | 3 - 5 | |
| pussytoes | ANTEN | 9 | 14 - 28 | 1 - 2 | 9 | 0 - 20 | 0 - 2 | 9 | 0 - 15 | 0 - 3 | 9 | 12 - 24 | 1 - 2 | |
| scarlet gaura | GACO5 | 9 | 14 - 28 | 1 - 2 | 9 | 0 - 20 | 0 - 2 | | | | 9 | 12 - 24 | 1 - 2 | |
| scarlet globemallow | SPOCO | 9 | 14 - 28 | 1 - 2 | 9 | 10 - 30 | 1 - 3 | 9 | 15 - 25 | 3 - 5 | 9 | 12 - 24 | 1 - 2 | |
| scurfpea | PSORA2 | 9 | 14 - 70 | 1 - 5 | 9 | 10 - 50 | 1 - 5 | 9 | 5 - 25 | 1 - 5 | 9 | 12 - 60 | 1 - 5 | |
| spiny phlox | PHHO | 9 | 0 - 42 | 0 - 3 | 9 | 0 - 30 | 0 - 3 | 9 | 0 - 15 | 0 - 3 | 9 | 0 - 36 | 0 - 3 | |
| sterile hymenoxys | TEAC | 9 | 0 - 14 | 0 - 1 | 9 | 0 - 20 | 0 - 2 | 9 | 0 - 15 | 0 - 3 | 9 | 0 - 12 | 0 - 1 | |
| stiff sunflower | HEPA19 | 9 | 14 - 42 | 1 - 3 | 9 | 0 - 20 | 0 - 2 | | | | 9 | 12 - 36 | 1 - 3 | |
| western ragweed | AMPS | 9 | 0 - 14 | 0 - 1 | 9 | 0 - 20 | 0 - 2 | 9 | 0 - 15 | 0 - 3 | 9 | 0 - 12 | 0 - 1 | |
| western yarrow | ACMI2 | 9 | 0 - 28 | 0 - 2 | 9 | 0 - 30 | 0 - 3 | 9 | 0 - 25 | 0 - 5 | 9 | 0 - 24 | 0 - 2 | |
| woolly Indianwheat | PLPA2 | | | | | | | 9 | 5 - 15 | 1 - 3 | 9 | 0 - 24 | 0 - 2 | |
| woolly verbena | VEST | | | | | | | 9 | 0 - 15 | 0 - 3 | 9 | 0 - 24 | 0 - 2 | |
| other perennial forbs | ZFP | 9 | 0 - 28 | 0 - 2 | 9 | 0 - 30 | 0 - 3 | 9 | 0 - 25 | 0 - 5 | 9 | 0 - 24 | 0 - 2 | |
| SHRUBS | | 10 | 28 - 140 | 2 - 10 | 10 | 50 - 150 | 5 - 15 | 10 | 25 - 100 | 5 - 20 | 10 | 24 - 120 | 2 - 10 | |
| big sagebrush | ARTR2 | 10 | 0 - 70 | 0 - 5 | 10 | 0 - 50 | 0 - 5 | 10 | 0 - 25 | 0 - 5 | 10 | 0 - 60 | 0 - 5 | |
| cactus | OPUNT | 10 | 0 - 28 | 0 - 2 | 10 | 0 - 20 | 0 - 2 | 10 | 5 - 50 | 1 - 10 | 10 | 0 - 24 | 0 - 2 | |
| creeping juniper | JUHO2 | 10 | 0 - 70 | 0 - 5 | 10 | 0 - 50 | 0 - 5 | 10 | 0 - 5 | 0 - 1 | 10 | 0 - 60 | 0 - 5 | |
| fringed sagewort | ARFR4 | 10 | 14 - 70 | 1 - 5 | 10 | 30 - 70 | 3 - 7 | 10 | 25 - 75 | 5 - 15 | 10 | 12 - 60 | 1 - 5 | |
| leadplant | AMCA6 | 10 | 0 - 70 | 0 - 5 | 10 | 0 - 50 | 0 - 5 | | | | | | | |
| rose | ROSA5 | 10 | 0 - 70 | 0 - 5 | 10 | 0 - 50 | 0 - 5 | 10 | 0 - 25 | 0 - 5 | 10 | 0 - 60 | 0 - 5 | |
| saltbush | ATRIP | 10 | 0 - 70 | 0 - 5 | 10 | 0 - 50 | 0 - 5 | 10 | 0 - 15 | 0 - 3 | 10 | 0 - 60 | 0 - 5 | |
| skunkbush sumac | RHTR | 10 | 0 - 70 | 0 - 5 | 10 | 0 - 50 | 0 - 5 | 10 | 0 - 25 | 0 - 5 | 10 | 0 - 60 | 0 - 5 | |
| winterfat | KRLA2 | 10 | 0 - 70 | 0 - 5 | 10 | 0 - 50 | 0 - 5 | | | | | | | |
| yucca | YUGL | 10 | 0 - 28 | 0 - 2 | 10 | 0 - 50 | 0 - 5 | 10 | 5 - 50 | 1 - 10 | 10 | 0 - 24 | 0 - 2 | |
| other shrubs | ZSHRUB | 10 | 0 - 70 | 0 - 5 | 10 | 0 - 50 | 0 - 5 | 10 | 0 - 25 | 0 - 5 | 10 | 0 - 60 | 0 - 5 | |
| TREES | | 11 | 0 - 14 | 0 - 1 | 11 | 0 - 10 | 0 - 1 | 11 | | | 11 | 60 - 240 | 5 - 20 | |
| juniper | JUNIP | 11 | 0 - 14 | 0 - 1 | 11 | 0 - 10 | 0 - 1 | | | | 11 | 60 - 240 | 5 - 20 | |
| ponderosa pine | PIPO | 11 | 0 - 14 | 0 - 1 | 11 | 0 - 10 | 0 - 1 | | | | 11 | 60 - 240 | 5 - 20 | |
| Annual Production lbs./acre | | | LOW | RV | HIGH | LOW | RV | HIGH | LOW | RV | HIGH | LOW | RV | HIGH |
| GRASSES & GRASS-LIKES | | | 810 | 1204 | 1595 | 460 | 770 | 1175 | 310 | 375 | 590 | 570 | 888 | 1200 |
| FORBS | | | 65 | 105 | 145 | 95 | 125 | 165 | 20 | 63 | 105 | 55 | 90 | 125 |
| SHRUBS | | | 25 | 84 | 145 | 45 | 100 | 155 | 20 | 63 | 105 | 20 | 72 | 125 |
| TREES | | | 0 | 7 | 15 | 0 | 5 | 15 | | | | 55 | 150 | 250 |
| TOTAL | | | 900 | 1400 | 1900 | 600 | 1000 | 1500 | 350 | 500 | 800 | 700 | 1200 | 1700 |

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 and Vegetation State Narratives

Following are the narratives for each of the described plant communities. These plant communities may not represent every possibility, but they are the most prevalent and repeatable plant communities. The plant composition tables shown above have been developed from the best available knowledge at the time of this revision. As more information is collected, some of these plant community descriptions may be revised or removed, and new ones 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 (DPC's) 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.

Bluestem/Sideoats Grama/Needlegrass Plant Community

The plant community upon which interpretations are primarily based is the Bluestem/Sideoats Grama/Needlegrass Plant Community. This is also considered to be the Historic Climax Plant Community (HCPC). This plant community can be found on areas that are properly managed with grazing and/or prescribed burning, and sometimes on areas receiving occasional short periods of deferment. The potential vegetation is about 80-90% grasses or grass-like plants, 5-10% forbs, and 2-10% shrubs. A mixture of cool and warm season grasses dominates the site.

Major grasses include the sideoats grama, little bluestem, needleandthread, big bluestem, western wheatgrass and blue grama. Other grasses and grass-likes occurring include hairy grama, plains muhly, and sedge. Significant forbs include purple coneflower and purple prairie clover. Shrubs occurring in this plant community fringed sagewort and yucca, with big sagebrush, winterfat and saltbush being common on the western portion of the MLRA.

This plant community is extremely resilient and well adapted to the Northern Great Plains climatic conditions. The diversity in plant species allows for high drought tolerance. 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.

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

Growth curve number: SD6004

Growth curve name: Pierre Shale Plains, 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 | 3 | 7 | 18 | 25 | 25 | 15 | 7 | 1 | 0 | 0 |

Transitional pathways and/or community pathways leading to other plant communities are as follows:

- Continuous seasonal grazing or patch grazing under continuous season-long grazing will convert this plant community to the *Needleandthread/Little Bluestem/Grama Plant Community*.
- Encroachment (or escaped), nonuse, and no fire will lead to a *Juniper/Pine Encroachment Plant Community*. This occurs when this plant community is protected from natural fires, or controlled burning.

Needleandthread/Little Bluestem/Grama Plant Community

This plant community evolved under continuous seasonal grazing or in some cases with patch grazing under continuous season-long grazing. Needleandthread, little bluestem and blue grama are significant species in this plant community. Big bluestem and sideoats grama have decreased, while the short grasses and grass-likes, such as blue grama, hairy grama, and sedge have increased. Other grasses occurring in this plant community include western wheatgrass, prairie junegrass and prairie sandreed. Forbs commonly found in this plant community include purple coneflower, purple prairie clover and dotted gayfeather. Significant shrubs include yucca, cactus, rose and fringed sagewort.

This plant community is moderately resistant to change. The herbaceous species present are well adapted to grazing; however, species composition can be altered through long-term overgrazing. If the herbaceous component is intact, it tends to be resilient if the disturbance is not long-term.

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

Growth curve number: SD6003

Growth curve name: Pierre Shale Plains, cool-season/warm-season co-dominant.

Growth curve description: Cool-season, warm-season co-dominant.

| JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0 | 0 | 3 | 10 | 20 | 28 | 21 | 10 | 5 | 3 | 0 | 0 |

Transitional pathways and/or community pathways leading to other plant communities are as follows:

- Heavy continuous grazing will convert the plant community to the *Grama/Sedge/Sagewort Plant Community*.
- Prescribed grazing will convert this plant community to the *Bluestem/Sideoats Grama/Needlegrass Plant Community*.

Blue Grama/Sedge/Sagewort Plant Community

This plant community evolves from heavy grazing over several years time. Diversity is lost, as the short grasses become dominant in the plant community. The grazing tolerant blue or hairy grama, and threadleaf sedge have replaced big bluestem, little bluestem, western wheatgrass and green needlegrass. Sideoats grama and needleandthread remains in the plant community, but is less productive because of the grazing pressure. Because of the grazing pressure, threeawn, fringed sagewort, green sagewort, broom snakeweed, yucca, Hood's phlox, woolly Indianwheat, pussytoes, western ragweed and cactus become more prevalent in the plant community.

This plant community is typically resistant to change. Runoff will increase and infiltration will decrease. Continued overuse results in an increase of bare ground and higher erosion potential.

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

Growth curve number: SD6004

Growth curve name: Pierre Shale Plains, 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 | 3 | 7 | 18 | 25 | 25 | 15 | 7 | 1 | 0 | 0 |

Transitional pathways and/or community pathways leading to other plant communities are as follows:

- Long-term prescribed grazing may convert this plant community to the *Needleandthread/Little Bluestem/Grama Plant Community*.

Juniper/Pine Encroachment Plant Community

This plant community more commonly occurs in the 16 to 18 inch precipitation zone of this MLRA. Historically, ponderosa pine and juniper was confined to rocky ridges and steep shallow slopes with rock outcrops located adjacent to this ecological site. Currently, ponderosa pine and juniper are expanding on to this ecological site due to the suppression of fire. Juniper/pine canopy is greater than 15% of mature trees. The understory is made up of about 60-85% grasses and grass-like species, 5-10% forbs, and 2-10% shrubs.

Dominant grasses and grass-likes include needleandthread, little bluestem, sideoats grama, blue grama and sedge. Grasses of secondary importance include Canada wildrye, green needlegrass, western wheatgrass and big bluestem. As the canopy increases, warm-season grasses tend to decrease as the cool-season grasses initially increase. Forbs commonly found in this community include green sagewort, western yarrow and pussytoes. Non-native species such as cheatgrass and bluegrass will tend to invade this plant community. The total annual herbaceous production (air-dry weight) of this plant community is about 1000 lbs./acre, but it can vary greatly depending on the canopy cover of the overstory.

When compared to the Bluestem/Sideoats Grama/Needlegrass Plant Community, ponderosa pine or juniper increases significantly. The grass component decreases dramatically as the buildup of pine and juniper needles increases. Annual herbaceous production also decreases significantly. While the juniper/pine canopy provides excellent protection from the weather for both livestock and wildlife, it is not capable of supporting large numbers of wildlife and livestock due to decreased production.

This plant community is resistant to change. A significant reduction of juniper/pine can only be accomplished through timber harvesting or crown fire. The vegetation in the understory is capable of enduring fire; however, very hot crown fires will have a detrimental effect to the plant community. Reclamation of juniper/pine dominated areas can be costly and prove to be temporary without proper management (i.e., prescribed burning, and prescribed grazing).

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

Growth curve number: SD6011

Growth curve name: Pierre Shale Plains, heavy conifer canopy.

Growth curve description: Mature ponderosa pine/juniper overstory.

| JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1 | 3 | 7 | 11 | 24 | 27 | 12 | 5 | 4 | 3 | 2 | 1 |

Transitional pathways and/or community pathways leading to other plant communities are as follows:

- Wildfire (hot, crown fires) will move this plant community towards the *Needleandthread/Little Bluestem/Grama Plant Community*.
- Removal of juniper/pine by timber harvest will allow the understory to develop and convert to the *Needleandthread/Little Bluestem/Grama Plant Community*.

Ecological Site Interpretations

Animal Community – Wildlife Interpretations

-- Under Development --

Bluestem/Sideoats Grama/Needlegrass Plant Community:

Needleandthread/Little Bluestem/Grama Plant Community:

Grama/Sedge/Sagewort Plant Community:

Juniper/Pine Encroachment Plant Community:

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

| Common Name | Cattle | Sheep | Horses | Deer | Antelope | Bison | Elk |
|----------------------------------|---------|---------|---------|---------|----------|---------|---------|
| Grasses & Grass-likes | | | | | | | |
| big bluestem | U D P D | U U D U | U D P D | U D U U | U D U U | U D P D | U D P D |
| blue grama | U D P D | D P P D | U D P U | D P P D | D P P D | U D P U | U D P U |
| buffalograss | U U P D | U U P D | U U D U | N U D U | N U D U | U U D U | U U 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 D | 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 | U U D U | 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 |
| 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 U D U | U U D U | U D D U | U D D U |
| sedge | U P U D | U P U 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 D | U P D D | U D P U | U P D U | U P D U | U D P U | U D P U |
| western wheatgrass | U P D D | U D U U | U P D U | N D N N | N D N N | U P D U | U P D U |
| Forbs | | | | | | | |
| American vetch | 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 |
| 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 |
| 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 P P U |
| deervetch | U U U U | U D D U | U U U U | U D D U | U D D U | U U U U | U D 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 |
| erigonum | 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 |
| false boneset | U U D U | N D U N | U U D U | N D U N | N D U N | U U D U | N D U N |
| 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 |
| 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 | N N N 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 |
| Indian breadroot | 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 |
| 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 |
| 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 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 |
| 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 |
| purple 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 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 |
| scarlet globemallow | 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 D D U |
| scurfspea | 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 |
| spiny phlox | U D U U | U D D U | U D U U | U D D U | U D D U | U D U U | U D D U |
| stemless hymenoxys | 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 |
| 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 |
| western ragweed | U U U U | U U U U | U U U U | N N N N | N N N N | U U U U | N N N N |
| western yarrow | 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 |
| Shrubs | | | | | | | |
| big sagebrush | U U U U | D U U D | U N U U | P U D P | P P P P | U N U U | D U U U |
| 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 |
| creeping juniper | 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 |
| 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 |
| 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 |
| 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 |
| saltbush | 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 D P |
| skunkbush sumac | D U U D | D D D D | D U U D | D U U D | D U U D | D U U D | D U U D |
| winterfat | P P P P | P P P P | P P P P | P P P P | P P P P | P P P P | P P P P |
| yucca | 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 |
| Trees | | | | | | | |
| 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 |
| 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 |

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 annual, suggested initial stocking rates with average growing conditions. These are conservative estimates that should be used only as guidelines in the initial stages of conservation planning. Often, the current plant composition does not entirely match any particular plant community (as described in this ecological site description). Because of this a resource inventory is necessary to document plant composition and production. More accurate carrying capacity estimates should eventually be calculated using the following stocking rate information along with animal preference data and actual stocking records, particularly when grazers other than cattle are involved. With consultation of the land manager, more intensive grazing management may result in improved harvest efficiencies and increased carrying capacity.

| Plant Community | Average Annual Production (lbs./acre, air-dry) | Stocking Rate* (AUM/acre) |
|---------------------------------------|---|--------------------------------------|
| Bluestem/Sideoats Grama/Needlegrass | 1400 | 0.44 |
| Needleandthread/Little Bluestem/Grama | 1000 | 0.32 |
| Blue Grama/Sedge/Sagewort | 500 | 0.16 |
| Juniper/Pine Encroachment | 1200 | ** |

* Based on 790 lbs./acre (air-dry weight) per Animal Unit Month (AUM), and on 25% harvest efficiency (refer to USDA NRCS, National Range and Pasture Handbook).

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

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

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 slow to moderate and runoff varies from high to very high 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. An exception would be where short grasses form a dense sod and dominate the site. Normally 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

Other Products

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

Supporting Information

Associated Sites

(060AY012SD) – Thin Upland
(060AY009SD) – Sandy

(060AY010SD) – Loamy 13-16" P.Z.
(060AY041SD) – Loamy 16-18" P.Z.

Similar Sites

(060AY012SD) – Thin Upland [more little bluestem, slightly higher production]
(060AY016SD) – Very Shallow [lower production, lower diversity, more rocks on the surface]

Inventory Data References (narrative)

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range trained personnel was also used. Those involved in developing this site description include: Stan Boltz, Range Management Specialist, NRCS; Darrel DuVall, Range Management Specialist, NRCS; Jill Epley, Range Management Specialist, NRCS; Cheryl Nielsen, Range Management Specialist, NRCS; Rick Peterson, Range Management Specialist, NRCS; Mike Stirling, Range Management Specialist, NRCS.

| <u>Data Source</u> | <u>Number of Records</u> | <u>Sample Period</u> | <u>State</u> | <u>County</u> |
|--------------------|--------------------------|----------------------|--------------|---------------|
| SCS-RANGE-417 | | | | |

State Correlation

This site has been correlated between Montana, Nebraska, South Dakota & Wyoming in MLRA 60A.

Field Offices

| | | | | |
|-------------------|--------------|-----------------|----------------|--------------|
| Belle Fourche, SD | Custer, SD | Hot Springs, SD | Pine Ridge, SD | Sundance, WY |
| Broadus, MT | Ekalaka, MT | Lusk, WY | Rapid City, SD | Wall, SD |
| Buffalo, SD | Faith, SD | Martin, SD | Rushville, NE | |
| Chadron, NE | Gillette, WY | Newcastle, WY | Sturgis, SD | |

Relationship to Other Established Classifications

Level IV Ecoregions of the Conterminous United States: 43e – Sagebrush Steppe, 43g – Semiarid Pierre Shale Plains, and 43k – Dense Clay Prairie.

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>)

USDA, NRCS. National Range and Pasture Handbook, September 1997

USDA, NRCS. National Soil Information System, Information Technology Center, 2150 Centre Avenue, Building A, Fort Collins, CO 80526. (<http://nasis.nrcs.usda.gov>)

USDA, NRCS, 2002. National Soil Survey Handbook, title 430-VI. (<http://soils.usda.gov/procedures/handbook/main.htm>)

USDA, NRCS. 2001. The PLANTS Database, Version 3.1 (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

USDA, NRCS, Various Published Soil Surveys.

Site Description Approval

MT, State Range Management Specialist Date

NE, State Range Management Specialist Date

SD, State Range Management Specialist Date

WY, State Range Management Specialist Date