

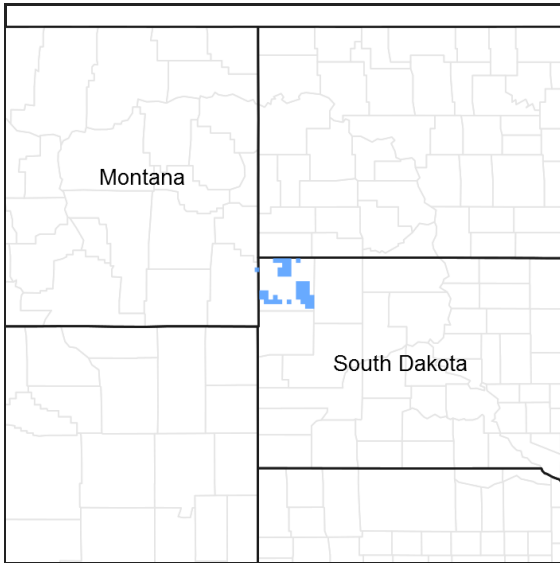
# Ecological site R058DY029SD

## Stony Hills

Accessed: 05/03/2024

### General information

**Provisional.** A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.



**Figure 1. Mapped extent**

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

### Classification relationships

Level IV Ecoregions of the Conterminous United States: 43e – Sagebrush Steppe.

### Associated sites

R058DY009SD	<b>Sandy</b>
R058DY012SD	<b>Thin Loamy</b>
R058DY024SD	<b>Shallow Loamy</b>
R058DY026SD	<b>Thin Sandy</b>

### Similar sites

R058DY010SD	<b>Loamy</b> Thin Sandy [prairie sandreed and sand bluestem present]
R058DY024SD	<b>Shallow Loamy</b> Shallow Loamy [less little bluestem; less production]

R058DY028SD	<b>Shallow Sandy</b> Shallow Sandy [more prairie sandreed, less production]
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**Table 1. Dominant plant species**

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Andropogon gerardii</i> (2) <i>Schizachyrium scoparium</i>

## Physiographic features

This site occurs on moderately steep to steep uplands.

**Table 2. Representative physiographic features**

Landforms	(1) Hill
Flooding frequency	None
Ponding frequency	None
Elevation	701–1,219 m
Slope	9–40%
Water table depth	203 cm
Aspect	Aspect is not a significant factor

## 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 to the east. Annual precipitation ranges from 14 to 16 inches. Most of the rainfall occurs as frontal storms early in the growing season. Some high intensity, convective thunderstorms occur in the summer. Precipitation in winter occurs as snow. 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. Outbreaks of cold air from Canada in winter move rapidly from northwest to southeast and account for extreme minimum temperatures. 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 44°F. January is the coldest month with average temperatures ranging from about 12°F (Marmarth, North Dakota (ND)), to about 20°F (Baker, Montana (MT)). July is the warmest month with temperatures averaging from about 70°F (Marmarth, ND), to about 76°F (Baker, MT). The range of normal average monthly temperatures between the coldest and warmest months is about 55°F.

Hourly winds are estimated to average about 11 miles per hour (mph) annually, ranging from about 13 mph during the spring to about 10 mph during the summer. Daytime winds are generally stronger than nighttime and strong storms may bring brief periods of high winds with gusts to more than 50 mph. 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. Greenup of cool-season plants may occur in September and October when adequate soil moisture is present.

**Table 3. Representative climatic features**

Frost-free period (average)	123 days
Freeze-free period (average)	140 days
Precipitation total (average)	406 mm

## Influencing water features

No significant water features influence this area.

## Soil features

The soils in this site are well drained and formed in colluvium weathered from sandstone. The surface layer is three to five inches thick. The texture surface layer is very fine sandy loam, while the subsurface layers range from loam to sandy loam and are gravelly, very gravelly or very cobbly. The soils have a moderately rapid infiltration rate. The soils on this site are modified by cobbles and stones that occur in the profile and at the surface. This site should show slight to no evidence of rills or wind scoured areas. Plant pedestalling occurs occasionally, but no exposed roots should occur. Water flow paths are typically not present but when visible, they are broken and irregular in appearance or discontinuous. The soil surface is stable and intact. Subsurface soil layers are nonrestrictive 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 20 percent.

Access Web Soil Survey (<http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm>) for specific local soils information.

**Table 4. Representative soil features**

Surface texture	(1) Very fine sandy loam
Family particle size	(1) Sandy
Drainage class	Well drained
Permeability class	Moderate to moderately rapid
Soil depth	102–203 cm
Surface fragment cover ≤3"	0–5%
Surface fragment cover >3"	0–5%
Available water capacity (0-101.6cm)	12.7 cm
Calcium carbonate equivalent (0-101.6cm)	0–15%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	6.1–8.4
Subsurface fragment volume ≤3" (Depth not specified)	40–65%
Subsurface fragment volume >3" (Depth not specified)	10–55%

## Ecological dynamics

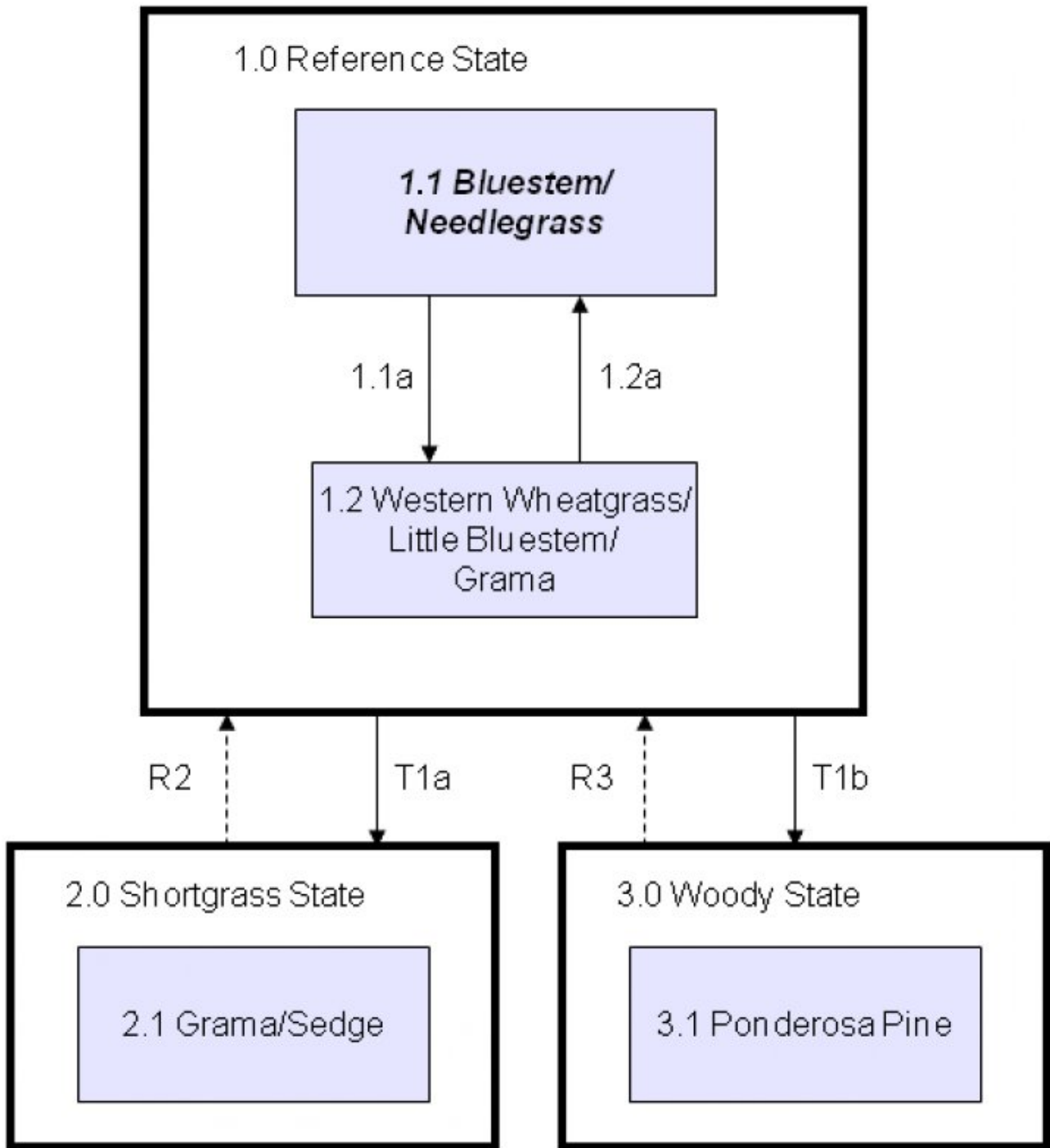
This site developed under Northern Great Plains climatic conditions, natural influences of large herbivores, occasional fire, and other biotic and abiotic factors that typically influence soil/site development. Changes will occur in the plant communities due to short-term weather variations, impacts 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 Bluestem/Needlegrass Plant Community. This plant community 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. Heavy continuous grazing and/or continuous seasonal (spring) grazing, without adequate recovery periods following each grazing occurrence causes this site to depart from the Bluestem/Needlegrass Plant Community. Blue grama will begin to increase. Western wheatgrass will increase initially and then begin to decrease. Green needlegrass will decrease in frequency and production. In time, heavy continuous grazing will likely cause upland sedges and blue grama to dominate. This resulting plant community is relatively stable and the competitive advantage prevents other species from establishing. This plant community is less productive than the Bluestem/Needlegrass Plant Community. Runoff increases and infiltration will decrease. Soil erosion will be minimal.

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.

## **State and transition model**



**State 1  
Reference**

The State narrative is under development.

**Community 1.1  
Bluestem/Needlegrass**

The plant community upon which interpretations are primarily based is the Bluestem/Needlegrass Plant Community. This is also considered to be climax. This plant community can be found on areas that are properly managed with grazing and/or prescribed burning, and on areas receiving occasional short periods of deferment. The potential vegetation is about 70 to 85 percent grasses or grass-like plants, 5 to 10 percent forbs, 5 to 10

percent shrubs, and 2 to 10 percent trees. A mixture of cool- and warm-season grasses dominates the plant community. Major grasses include little bluestem, big bluestem, green needlegrass, and needleandthread. Other grasses and grass-like species include sideoats grama, western wheatgrass, blue grama, prairie dropseed, porcupine grass, Canada wildrye, and sedge. Significant forbs include American pasqueflower, dotted gayfeather, false boneset, prairie clover, prairie coneflower, purple coneflower, and scarlet gaura. Significant shrubs found in this plant community include leadplant, rose, skunkbush sumac, and western snowberry. 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 offsite and natural plant mortality is very low. The diversity in plant species allows for high drought tolerance.

**Table 5. Annual production by plant type**

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1227	1594	2018
Shrub/Vine	95	151	224
Tree	39	121	224
Forb	95	151	224
<b>Total</b>	<b>1456</b>	<b>2017</b>	<b>2690</b>

**Figure 5. Plant community growth curve (percent production by month).**  
SD5804, Northern Rolling High Plains, warm-season dominant, cool-season sub-dominant.. Warm-season dominant, cool-season sub-dominant, uplands..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	7	18	24	25	15	7	1	0	0

## Community 1.2 Western Wheatgrass/Little Bluestem/Grama

This plant community develops under continuous seasonal grazing or continuous season-long grazing. Little bluestem, big bluestem, prairie dropseed, needleandthread, and green needlegrass decrease in abundance and vigor. Western wheatgrass initially increases in this plant community phase. Blue grama and sedge increase, and non-native species invade the plant community. Other significant grasses or grass-like species include porcupine grass, slender wheatgrass, hairy grama, prairie Junegrass, and bottlebrush squirreltail. Forbs commonly found in this plant community include cudweed sagewort, green sagewort, scurfpea, goldenrod, spiny phlox, western ragweed, and white prairie aster. Significant shrubs include fringed sagewort, creeping juniper, rose, and yucca. The potential vegetation is about 70 to 85 percent grasses or grass-like plants, 5 to 10 percent forbs, 5 to 10 percent shrubs, and 2 to 10 percent trees. Although production remains relatively high, little bluestem plants often become “wooly,” and largely not grazed due to lower palatability. 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. Also, certain species and/or classes of livestock will readily consume the little bluestem in any condition and result in a shift away from this plant community phase. If the herbaceous component is intact, it tends to be resilient if the disturbance is not long-term.

**Table 6. Annual production by plant type**

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	835	1240	1496
Shrub/Vine	73	118	174
Tree	28	94	174
Forb	73	118	174
<b>Total</b>	<b>1009</b>	<b>1570</b>	<b>2018</b>

Figure 7. Plant community growth curve (percent production by month).  
SD5803, Northern Rolling High Plains, cool-season/warm-season co-dominant.. Cool-season, warm-season co-dominant, uplands..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	10	20	28	21	10	5	3	0	0

**Pathway 1.1a**  
**Community 1.1 to 1.2**

Continuous seasonal grazing (grazing at the same time of year every year for extended periods) or continuous season-long grazing will convert this plant community to the Western Wheatgrass/Little Bluestem/Grama Plant Community.

**Pathway 1.2a**  
**Community 1.2 to 1.1**

Prescribed grazing that includes changing season of use and allowing adequate recovery periods will result in a shift back to Bluestem/Needlegrass Plant Community.

**Conservation practices**

Prescribed Grazing
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**State 2**  
**Shortgrass**

The State narrative is under development.

**Community 2.1**  
**Grama/Sedge**

This plant community is a result from heavy grazing over many years. Diversity is diminished, as the short grasses become dominant in the plant community. The grazing tolerant blue grama and sedges replace little bluestem, western wheatgrass, and the needlegrasses. Sideoats grama remains in the plant community, but is less productive because of competition and grazing pressure. Due to low palatability, cudweed sagewort, green sagewort, scurfpea, western ragweed, and western yarrow become more prevalent in the plant community. Fringed sagewort is the dominant shrub in this plant community. Other shrubs commonly found in this plant community include creeping juniper, yucca, and rose. The potential vegetation is about 75 to 85 percent grasses or grass-like plants, 2 to 7 percent forbs, 5 to 10 percent shrubs, and 5 to 10 percent trees. This plant community is resistant to change. The herbaceous species present are less palatable and/or more grazing tolerant than the dominant species in the Bluestem/Needlegrass Plant Community. The dominant grass and grass-like species typically have short, compact rooting systems near the soil surface. This results in reduced infiltration and increased runoff. Onsite soil erosion may remain low, but the increased runoff may have damaging effects on adjacent ecological sites (ES).

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	588	919	1239
Shrub/Vine	50	84	123
Tree	17	90	123
Forb	17	50	84
<b>Total</b>	<b>672</b>	<b>1143</b>	<b>1569</b>

Figure 9. Plant community growth curve (percent production by month).  
SD5804, Northern Rolling High Plains, warm-season dominant, cool-season

sub-dominant.. Warm-season dominant, cool-season sub-dominant, uplands..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	7	18	24	25	15	7	1	0	0

### State 3 Woody

The State narrative is under development.

### Community 3.1 Ponderosa Pine

Historically, ponderosa pine made up about 10 percent of the Bluestem/Needlegrass Plant Community. This ES occurs between ponderosa pine woodlands higher on the landscape and herbaceous dominated rangeland lower on the landscape. This ES is somewhat transitional between the two. The pre-European fire frequencies kept ponderosa pine from dominating this site. Rocky Mountain juniper occurs in lesser amounts with the ponderosa pine. After many years with no fire, ponderosa pine begins to increase on this site and eventually dominates the plant community. Canopy cover begins to close and the understory diminishes to extremely low levels. Species present in minor amounts include needleandthread, prairie Junegrass, Canada wildrye, Kentucky bluegrass, cheatgrass, cudweed sagewort, green sagewort, pussytoes, spiny phlox, western snowberry, and fringed sagewort. When compared to the Bluestem/Needlegrass Plant Community, ponderosa pine increases significantly. The grass component decreases dramatically as the buildup of pine and juniper needles increases. Annual production also decreases significantly. While the ponderosa 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 ponderosa 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 ponderosa pine dominated areas can be costly and prove to be temporary without proper management (i.e., prescribed burning, and prescribed grazing).

Figure 10. Plant community growth curve (percent production by month). SD5811, Northern Rolling High Plains, heavy conifer canopy.. 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

### Transition T1a State 1 to 2

Heavy continuous grazing will shift this plant community to the Grama/Sedge Plan Community.

### Transition T1b State 1 to 3

No fire for multiple years may result in the Ponderosa Pine Plant Community.

### Restoration pathway R2 State 2 to 1

Long-term prescribed grazing that includes changing season of use and allowing adequate recovery periods will slowly lead this plant community back through successional stages that may eventually result in a plant community resembling the Bluestem/Needlegrass Plant Community.

### Conservation practices



## Restoration pathway R3 State 3 to 1

Timber harvest, or wildfire may shift this plant community back to one closely resembling the Reference State.

### Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>Mid Warm-Season Grasses</b>			404–706	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	303–605	–
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	40–202	–
	prairie dropseed	SPHE	<i>Sporobolus heterolepis</i>	20–161	–
2	<b>Tall Warm-Season Grasses</b>			202–404	
	big bluestem	ANGE	<i>Andropogon gerardii</i>	202–404	–
3	<b>Cool-Season Bunch Grasses</b>			101–404	
	green needlegrass	NAVI4	<i>Nassella viridula</i>	40–303	–
	needle and thread	HECOC8	<i>Hesperostipa comata</i> ssp. <i>comata</i>	40–202	–
	porcupinegrass	HESP11	<i>Hesperostipa spartea</i>	0–101	–
	Canada wildrye	ELCA4	<i>Elymus canadensis</i>	0–101	–
4	<b>Wheatgrasses</b>			101–202	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	101–202	–
	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	0–101	–
5	<b>Short-Warm Season Grasses</b>			40–202	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	40–202	–
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	0–101	–
6	<b>Other Native Grasses</b>			20–101	
	Graminoid (grass or grass-like)	2GRAM	<i>Graminoid (grass or grass-like)</i>	0–81	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	20–61	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	0–40	–
7	<b>Grass-Likes</b>			20–101	
	sedge	CAREX	<i>Carex</i>	20–101	–
	Grass-like (not a true grass)	2GL	<i>Grass-like (not a true grass)</i>	0–61	–
<b>Forb</b>					
9	<b>Forbs</b>			101–202	
	Forb, native	2FN	<i>Forb, native</i>	20–81	–
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	20–40	–
	pussytoes	ANTEN	<i>Antennaria</i>	20–40	–
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	20–40	–
	milkvetch	ASTRA	<i>Astragalus</i>	20–40	–
	false honeset	RRFII	<i>Brickellia eupatorioides</i>	20–40	–

	prairie clover	DALEA	<i>Dalea</i>	20-40	-
	blacksamson echinacea	ECAN2	<i>Echinacea angustifolia</i>	20-40	-
	scarlet beeblossom	GACO5	<i>Gaura coccinea</i>	20-40	-
	spiny phlox	PHHO	<i>Phlox hoodii</i>	20-40	-
	scurfpea	PSORA2	<i>Psoralegium</i>	20-40	-
	cutleaf anemone	PUPAM	<i>Pulsatilla patens ssp. multifida</i>	20-40	-
	upright prairie coneflower	RACO3	<i>Ratibida columnifera</i>	20-40	-
	goldenrod	SOLID	<i>Solidago</i>	20-40	-
	white prairie aster	SYFA	<i>Symphotrichum falcatum</i>	20-40	-
	dotted blazing star	LIPU	<i>Liatris punctata</i>	20-40	-
	Nuttall's sensitive-briar	MINU6	<i>Mimosa nuttallii</i>	0-20	-
	beardtongue	PENST	<i>Penstemon</i>	0-20	-
	old man's whiskers	GETR	<i>Geum triflorum</i>	0-20	-
	sego lily	CANU3	<i>Calochortus nuttallii</i>	0-20	-
	field sagewort	ARCA12	<i>Artemisia campestris</i>	0-20	-
	western yarrow	ACMIO	<i>Achillea millefolium var. occidentalis</i>	0-20	-
<b>Shrub/Vine</b>					
10	<b>Shrubs</b>			101-202	
	leadplant	AMCA6	<i>Amorpha canescens</i>	20-81	-
	Shrub (>.5m)	2SHRUB	<i>Shrub (&gt;.5m)</i>	0-61	-
	dwarf false indigo	AMNA	<i>Amorpha nana</i>	20-40	-
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	20-40	-
	skunkbush sumac	RHTR	<i>Rhus trilobata</i>	0-40	-
	rose	ROSA5	<i>Rosa</i>	20-40	-
	western snowberry	SYOC	<i>Symphoricarpos occidentalis</i>	20-40	-
	soapweed yucca	YUGL	<i>Yucca glauca</i>	0-20	-
	creeping juniper	JUHO2	<i>Juniperus horizontalis</i>	0-20	-
<b>Tree</b>					
11	<b>Trees</b>			40-202	
	ponderosa pine	PIPO	<i>Pinus ponderosa</i>	40-202	-
	Rocky Mountain juniper	JUSC2	<i>Juniperus scopulorum</i>	0-101	-
	Tree	2TREE	<i>Tree</i>	0-61	-

Table 9. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>Mid Warm-Season Grasses</b>			78-314	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	78-235	-
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	0-126	-
	prairie dropseed	SPHE	<i>Sporobolus heterolepis</i>	0-63	-
2	<b>Tall Warm-Season Grasses</b>			0-78	
	big bluestem	ANGE	<i>Andropogon gerardii</i>	0-78	-

3	<b>Cool-Season Bunch Grasses</b>			16–157	
	needle and thread	HECOC8	<i>Hesperostipa comata</i> ssp. <i>comata</i>	16–110	–
	green needlegrass	NAVI4	<i>Nassella viridula</i>	0–78	–
	porcupinegrass	HESP11	<i>Hesperostipa spartea</i>	0–31	–
	Canada wildrye	ELCA4	<i>Elymus canadensis</i>	0–16	–
4	<b>Wheatgrasses</b>			157–314	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	157–314	–
	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	0–47	–
5	<b>Short-Warm Season Grasses</b>			78–235	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	78–235	–
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	0–126	–
6	<b>Other Native Grasses</b>			16–78	
	Graminoid (grass or grass-like)	2GRAM	<i>Graminoid (grass or grass-like)</i>	0–63	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	16–47	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	0–31	–
7	<b>Grass-Likes</b>			31–157	
	sedge	CAREX	<i>Carex</i>	31–157	–
	Grass-like (not a true grass)	2GL	<i>Grass-like (not a true grass)</i>	0–47	–
8	<b>Non-Native Grasses</b>			0–78	
	cheatgrass	BRTE	<i>Bromus tectorum</i>	0–78	–
	bluegrass	POA	<i>Poa</i>	0–78	–
<b>Forb</b>					
9	<b>Forbs</b>			78–157	
	Forb, introduced	2FI	<i>Forb, introduced</i>	0–78	–
	Forb, native	2FN	<i>Forb, native</i>	16–78	–
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	16–47	–
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	16–47	–
	scurfpea	PSORA2	<i>Psoraleidium</i>	16–47	–
	dotted blazing star	LIPU	<i>Liatris punctata</i>	0–31	–
	spiny phlox	PHHO	<i>Phlox hoodii</i>	16–31	–
	milkvetch	ASTRA	<i>Astragalus</i>	16–31	–
	pussytoes	ANTEN	<i>Antennaria</i>	16–31	–
	field sagewort	ARCA12	<i>Artemisia campestris</i>	0–31	–
	western yarrow	ACMIO	<i>Achillea millefolium</i> var. <i>occidentalis</i>	0–31	–
	upright prairie coneflower	RACO3	<i>Ratibida columnifera</i>	16–31	–
	goldenrod	SOLID	<i>Solidago</i>	16–31	–
	white prairie aster	SYFA	<i>Symphotrichum falcatum</i>	16–31	–
	false boneset	BREU	<i>Brickellia eupatorioides</i>	0–16	–
	prairie clover	DALEA	<i>Dalea</i>	0–16	–
	blacksamson echinacea	ECAN2	<i>Echinacea angustifolia</i>	0–16	–
	scarlet beeblossom	GACO5	<i>Gaura coccinea</i>	0–16	–
	cutleaf anemone	PUPAM	<i>Pulsatilla patens</i> ssp. <i>multifida</i>	0–16	–

Shrub/Vine					
10	<b>Shrubs</b>			78–157	
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	16–63	–
	creeping juniper	JUHO2	<i>Juniperus horizontalis</i>	0–47	–
	rose	ROSA5	<i>Rosa</i>	16–47	–
	soapweed yucca	YUGL	<i>Yucca glauca</i>	16–47	–
	Shrub (>.5m)	2SHRUB	<i>Shrub (&gt;.5m)</i>	0–47	–
	leadplant	AMCA6	<i>Amorpha canescens</i>	0–31	–
	western snowberry	SYOC	<i>Symphoricarpos occidentalis</i>	0–31	–
	skunkbush sumac	RHTR	<i>Rhus trilobata</i>	0–31	–
	dwarf false indigo	AMNA	<i>Amorpha nana</i>	0–16	–
Tree					
11	<b>Trees</b>			31–157	
	ponderosa pine	PIPO	<i>Pinus ponderosa</i>	31–157	–
	Rocky Mountain juniper	JUSC2	<i>Juniperus scopulorum</i>	0–78	–
	Tree	2TREE	<i>Tree</i>	0–47	–

Table 10. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	<b>Mid Warm-Season Grasses</b>			0–90	
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	0–67	–
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	0–56	–
3	<b>Cool-Season Bunch Grasses</b>			0–56	
	needle and thread	HECOC8	<i>Hesperostipa comata</i> ssp. <i>comata</i>	0–56	–
4	<b>Wheatgrasses</b>			0–56	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	0–56	–
5	<b>Short-Warm Season Grasses</b>			224–448	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	224–392	–
	hairy grama	BOHI2	<i>Bouteloua hirsuta</i>	0–112	–
6	<b>Other Native Grasses</b>			11–56	
	Graminoid (grass or grass-like)	2GRAM	<i>Graminoid (grass or grass-like)</i>	0–45	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	11–34	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	0–22	–
7	<b>Grass-Likes</b>			112–280	
	sedge	CAREX	<i>Carex</i>	112–280	–
	Grass-like (not a true grass)	2GL	<i>Grass-like (not a true grass)</i>	0–34	–
8	<b>Non-Native Grasses</b>			11–112	
	cheatgrass	BRTE	<i>Bromus tectorum</i>	11–90	–
	bluegrass	POA	<i>Poa</i>	0–56	–
Forb					
9	<b>Forbs</b>			22–78	

	Forb, introduced	2FI	<i>Forb, introduced</i>	0–45	–
	Forb, native	2FN	<i>Forb, native</i>	11–45	–
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	11–34	–
	milkvetch	ASTRA	<i>Astragalus</i>	11–22	–
	spiny phlox	PHHO	<i>Phlox hoodii</i>	11–22	–
	scurfpea	PSORA2	<i>Psoraleidium</i>	11–22	–
	western yarrow	ACMIO	<i>Achillea millefolium var. occidentalis</i>	0–22	–
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	11–22	–
	pussytoes	ANTEN	<i>Antennaria</i>	11–22	–
	field sagewort	ARCA12	<i>Artemisia campestris</i>	0–22	–
	goldenrod	SOLID	<i>Solidago</i>	11–22	–
	white prairie aster	SYFA	<i>Symphotrichum falcatum</i>	11–22	–
	upright prairie coneflower	RACO3	<i>Ratibida columnifera</i>	0–11	–
<b>Shrub/Vine</b>					
10	<b>Shrubs</b>			56–112	
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	11–67	–
	creeping juniper	JUHO2	<i>Juniperus horizontalis</i>	0–45	–
	soapweed yucca	YUGL	<i>Yucca glauca</i>	11–45	–
	Shrub (>.5m)	2SHRUB	<i>Shrub (&gt;.5m)</i>	0–34	–
	skunkbush sumac	RHTR	<i>Rhus trilobata</i>	0–22	–
	rose	ROSA5	<i>Rosa</i>	11–22	–
	western snowberry	SYOC	<i>Symphoricarpos occidentalis</i>	0–22	–
<b>Tree</b>					
11	<b>Trees</b>			22–112	
	ponderosa pine	PIPO	<i>Pinus ponderosa</i>	22–112	–
	Rocky Mountain juniper	JUSC2	<i>Juniperus scopulorum</i>	0–56	–
	Tree	2TREE	<i>Tree</i>	0–34	–

## Animal community

### Animal Community – Wildlife Interpretations

Major Land Resource Area (MLRA) 58D lies within the drier portion of Northern mixed-grass prairie ecosystem where sagebrush steppes to the west yield to grassland steppes to the east. Prior to European settlement, this area consisted of diverse grass/shrub land habitats interspersed with varying densities of depressional, in-stream wetlands, and woody riparian corridors. These habitats provided critical life cycle components for many of its users. Many species of grassland birds, small mammals, reptiles, amphibians, and herds of roaming bison, elk, and pronghorn were among the inhabitants adapted to this semi-arid region. Roaming herbivores, as well as, several small mammal and insect species, were the primary consumers linking the grassland resources to predators such as the wolf, mountain lion, and grizzly bear, as well as, smaller carnivores such as the coyote, bobcat, fox, and raptors. The black-tailed prairie dog was once abundant; however, the species remains a keystone species within its range. The black-footed ferret, burrowing owl, ferruginous hawk, mountain plover, and swift fox were associated with prairie dog complexes.

Historically, the Northern mixed-grass prairie was a disturbance-driven ecosystem with fire, herbivory, and climate functioning as the primary disturbance factors either singly or in combination. Following European settlement, livestock grazing, cropland conversion, elimination of fire, energy development, and other anthropogenic factors influenced species composition and abundance. Introduced and invasive species further impacted plant and animal communities. Bison were historically a keystone species but have been extirpated as a free-ranging herbivore. The

loss of the bison, reduction of prairie dog colonies, and loss of fire as ecological drivers greatly influenced the character of the remaining native plant communities and altered wildlife habitats. Human development has reduced habitat quality for area-sensitive species.

Within MLRA 58D, the Stony Hills ES provides upland grassland cover with an associated forb and shrub component. It was typically part of an expansive grassland landscape that included combinations of Shallow Loamy, Shallow Clayey, Claypan, Thin Claypan, Sandy, Sandy Claypan, Loamy, and Clayey ESs. This site provided habitat for species requiring unfragmented grassland.

Important habitat features and components found commonly or exclusively on this site may include coniferous forest habitat; sharp-tailed grouse leks; upland nesting habitat for grassland birds, forbs, and insects for brood habitat; and a forage source for small and large herbivores. Many grassland and shrub steppe nesting bird populations are declining. Extirpated species include free-ranging bison, grizzly bear, gray wolf, black-footed ferret, mountain plover, Rocky Mountain locust, and swift fox.

The majority of the Stony Hills ES remains intact and provides increasingly important habitat for conifer dwelling species, grassland and shrub steppe nesting birds, small rodents, coyotes, and a variety of reptiles, amphibians, and insects. Changes in historic fire regime and domestic grazing have impacted the forb/shrub/tree/grass percentages.

Bluestem/Needlegrass and Western Wheatgrass/Little Bluestem/Grama: The predominance of grasses plus high diversity of forbs and high abundance of shrubs and increased presence of evergreen tree species in this community favors grazers and mixed-feeders, such as deer and pronghorn. Insects, such as pollinators, play a large role in maintaining the forb community and provide a forage base for grassland birds and other species. The complex plant structural diversity provides habitat for a wide array of migratory and resident birds. Grassland nesting birds and sharp-tailed grouse may be present. Woodland dwelling birds such as red-headed woodpecker, sapsuckers, phoebes, western wood-pewee, vireos, nuthatches, thrushes, and grosbeaks may be present in lesser numbers. Diverse prey populations are available for raptors such as ferruginous hawk, Swainson's hawk, golden eagle, and prairie falcon.

The diversity of grasses, forbs, and shrubs provide high nutrition levels for small and large herbivores including voles, mice, thirteen-lined ground squirrel, white-tailed jackrabbit, and deer. The higher stature of this plant community provides thermal, protective, and escape cover for herbivores and grassland birds. Mammals such as bobcats, porcupines, mountain lions, and various bat species may be present and benefit from the structure and composition this plant community provides. Other predators utilizing this plant community include coyote, American badger, red fox, and long-tailed weasel. This plant community provides habitat for herptiles such as the spade foot toad, bull snake, and western rattlesnake.

The plant community shifts to a western wheatgrass, little bluestem, and grama community under continuous seasonal grazing and a low fire frequency. However, there is no substantial shift in the wildlife community.

Grama/Sedge: This plant community results from heavy, continuous grazing later in the growing season and a low fire frequency. Grama species (e.g., blue and hairy) and various sedge species will dominate. Forb and shrub species diversity and abundance are substantially reduced. Species such as horned lark, long-billed curlew, upland sandpiper, and white-tailed jackrabbit may be present. The shorter stature of this plant community limits suitable thermal, protective, and escape cover. Other predators utilizing this plant community include the coyote, American badger, red fox, and long-tailed weasel.

Extreme impairment of the ecological processes impacts offsite aquatic habitats through excessive runoff, nutrient, and sediment loads. Elevated surface temperatures resulting from reduced cover and litter will greatly reduce habitat for most amphibian species, grassland birds, and mammals.

Ponderosa Pine: Resulting from no fire for multiple years, the plant community is dominated by ponderosa pine with lesser amounts of Rocky Mountain juniper species. Due to the buildup of pine and juniper needles and closing of the forest canopy, understory vegetation is significantly limited. Grassland nesting birds and their associated predators are substantially reduced. Woodland dwelling birds such as red-headed woodpecker, sapsuckers, phoebes, western wood-pewee, vireos, nuthatches, thrushes, and grosbeaks may be present in lesser numbers. Mammals such as bobcats, porcupines, mountain lions, and various bat species may be common and benefit from

the structure and composition this plant community provides. Other predators utilizing this plant community include coyote, red fox, and long-tailed weasel.

#### **Animal Community – Grazing Interpretations**

As this site improves in condition through proper management (from the more short grass dominated plant communities to the interpretive plant community), the advantage for livestock production includes: higher forage production from cool-season grasses, improved early spring forage production, and higher water infiltration. The disadvantage for livestock include: reduction in cool-/warm-season grass mix which would provides better management flexibility, less plant diversity, and a potential increase in soil erosion. The Grama/Sedge Plant Community is of limited value for livestock production.

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

#### **Hydrological functions**

Water is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group B. Infiltration and runoff potential for this site varies from moderate to high depending on soil hydrologic group, slope, and ground cover. In many cases, areas with greater than 75 percent ground cover have the greatest potential for high infiltration and lower runoff. An exception would be where shortgrasses form a strong sod and dominate the site. Normally, areas where ground cover is less than 50 percent have the greatest potential to have reduced infiltration and higher runoff (refer to Section 4, NRCS National Engineering Handbook for runoff quantities and hydrologic curves).

#### **Recreational uses**

This site provides hunting opportunities for upland game species. The wide varieties of plants which bloom from spring until fall have an esthetic value that appeals to visitors.

#### **Wood products**

Ponderosa pine often does not occupy this site in amounts extensive enough to make timber harvest practical, and this site is not typically productive for tree species. Timber harvest may be a practical approach if the site is being reclaimed for livestock production.

#### **Other products**

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

#### **Inventory data references**

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations and experience were also used. Those involved in developing this site description include: Stan Boltz, Range Management Specialist, NRCS.

#### **Other references**

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## Contributors

SCB

Travis Patient

## Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

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Date	05/07/2010
Approved by	Stan Boltz
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

1. **Number and extent of rills:** Slight to none, typically on steeper slopes and discontinuous.
- 

2. **Presence of water flow patterns:** None, or barely visible and discontinuous with numerous debris dams when present.
- 

3. **Number and height of erosional pedestals or terracettes:** Few pedestalled plants typically on steeper slopes.
- 

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 5 to 20 percent is typical.
- 

5. **Number of gullies and erosion associated with gullies:** None should be present.
- 

6. **Extent of wind scoured, blowouts and/or depositional areas:** None.
- 

7. **Amount of litter movement (describe size and distance expected to travel):** Small size litter classes will generally



move short distances, some medium size class litter will move very short distances. Litter debris dams are occasionally present.

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil aggregate stability ratings should typically be 5 to 6, normally 6. Surface organic matter adheres to the soil surface. Soil surface fragments will typically retain structure indefinitely when dipped in distilled water.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** A-horizon should be 2 to 5 inches thick with light to dark brownish gray colors. Structure should typically be fine granular at least in the upper A-horizon.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Combination of shallow and deep rooted species (mid & tall rhizomatous and tufted perennial cool- and warm-season grasses) with fine and coarse roots positively influences infiltration.

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

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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

Dominant: Mid warm-season grasses >>

Sub-dominant: Tall warm-season grasses = Mid/tall cool-season bunchgrasses >

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

Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Very little evidence of decadence or mortality. Bunch grasses have strong, healthy centers and shrubs are vigorous.

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14. **Average percent litter cover (%) and depth ( in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Production ranges from 1,300-2,400 lbs./acre (air-dry weight). Reference value production is 1,800 lbs./acre (air-dry weight).

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if**

**their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site: State and local noxious weeds**

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17. **Perennial plant reproductive capability:** All species exhibit high vigor relative to climatic conditions. Do not rate based solely on seed production. Perennial grasses should have vigorous rhizomes or tillers.
-