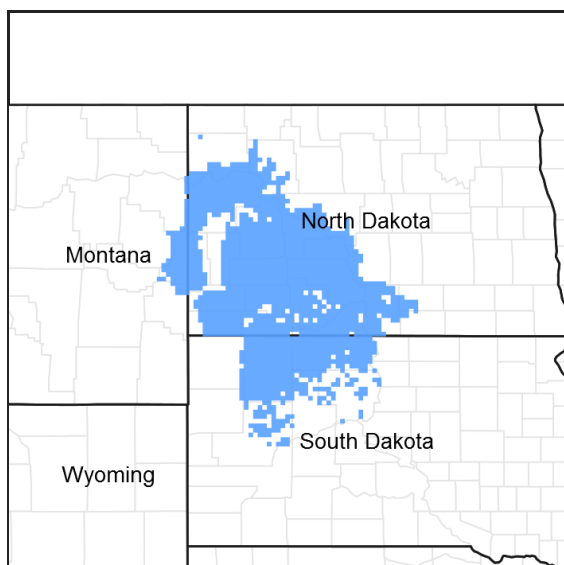


# **Ecological site R054XY035ND** **Very Shallow**

Accessed: 05/11/2025

## **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: 43a – Missouri Plateau.

## **Associated sites**

R054XY021ND	<b>Claypan</b>
R054XY030ND	<b>Shallow Loamy</b>
R054XY034ND	<b>Choppy Sands</b>
R054XY038ND	<b>Thin Loamy</b>
R054XY043ND	<b>Shallow Sandy</b>
R054XY045ND	<b>Limy Sands</b>

## **Similar sites**

R054XY030ND	<b>Shallow Loamy</b> [Somewhat excessively well-drained soils more than 10 less than 20 inches to sedimentary bedrock that restricts root penetration. Surface layer will ribbon less than 2 inches and greater than 1 inch. Upslope from thin loamy or loamy sites and some times down slope form very shallow ecological sites. Indicator species: little bluestem, plains muhly, needle grasses and sideoats grama, with dotted gayfeather, pasqueflower, purple coneflower and purple prairie clover, and shrubs like broom snakeweed. This site has similar species but less needleandthread, blue grama and little bluestem, more plains muhly, green needlegrass, western wheatgrass, restrictive layer below 10 inches down to 20 inches to sedimentary bedrock, more production.]
R054XY043ND	<b>Shallow Sandy</b> [Some what excessively well drained soils more than 10 less than 20 inches to sedimentary sandstone bedrock and/or gravels that restricts root penetration. Surface layer will ribbon less than 1 inch unless above gravels than more than 1 but less than 2 inches. Upslope from thin loamy, limy sands, sands or sandy sites and some times down slope form very shallow ecological sites. Indicator species: little bluestem, prairie sandreed, sand bluestem, and needle grasses, with dotted gayfeather, pasqueflower, purple coneflower and purple prairie clover, and shrubs like prairie rose and yucca. This site has similar species but less needleandthread, blue grama and little bluestem, more prairie sandreed, sand bluestem, restrictive layer below 10 inches down to 20 inches to sedimentary sandstone bedrock or gravels, more production.]
R054XY033ND	<b>Thin Claypan</b> [Well drained soils on uplands or terraces that don't receive extra moisture with a dense sodic subsoil above 6 inches and with salts above 16 inches that restricts root penetration. Usually found in micro relief within Claypan sites, indicator species are western wheatgrass, Sandberg's bluegrass with an understory of blue grama and buffalograss, heath aster, cudweed sagewort and western yarrow along with a few shrubs of fringed sagewort, cactus and Nuttall's Saltbush. This site has no little bluestem, less steeper slopes, similar production, and a different restrictive layer.]
R054XY028ND	<b>Shallow Clayey</b> [Some what excessively well drained soils more than 10 less than 20 inches to unweathered shales that restricts root penetration. Upslope of clayey site, surface layer will ribbon greater than 2 inches, upslope of clayey ecological site. Indicator species: western wheatgrass dominates with little bluestem, plains muhly and sideoats grama, gayfeather. This site has similar species but less needleandthread, blue grama and little bluestem, more plains muhly, green needlegrass, western wheatgrass, restrictive layer below 10 inches down to 20 inches to unweathered shales, more production.]

**Table 1. Dominant plant species**

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Hesperostipa comata ssp. comata</i> (2) <i>Schizachyrium scoparium</i>

## Physiographic features

This site typically occurs on gently undulating to rolling sedimentary uplands.

**Table 2. Representative physiographic features**

Landforms	(1) Hill (2) Escarpment (3) Ridge
Flooding frequency	None
Ponding frequency	None
Elevation	1,600–3,600 ft
Slope	6–50%
Aspect	Aspect is not a significant factor

## Climatic features

MLRA 54 is considered to have a continental climate – cold winters and hot summers, low humidity, light rainfall, and much sunshine. Extremes in temperature are characteristic. The climate is the result of this MLRA's location in the geographic center of North America. There are few natural barriers on the northern Great Plains. The air masses move unobstructed across the plains and account for rapid changes in temperature.

Annual precipitation ranges from 14 to 18 inches per year. The normal average annual temperature is about 42° F. January is the coldest month with average temperatures ranging from about 13° F (Beach, ND) to about 16° F (Bison, SD). July is the warmest month with temperatures averaging from about 69° F (Beach, ND) to about 72° F (Timber Lake, SD). The range of normal average monthly temperatures between the coldest and warmest months is about 57° F. This large annual range attests to the continental nature of this MLRA's climate. 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.

Growth of native cool-season plants begins in late March and continues to early to mid July. Native warm-season plants begin growth in mid May and continue to the end of August. Green up of cool-season plants can occur in September and October when adequate soil moisture is present.

**Table 3. Representative climatic features**

Frost-free period (average)	136 days
Freeze-free period (average)	157 days
Precipitation total (average)	18 in

## Influencing water features

No significant water features influence this site.

## Soil features

The common features of soils in this site are the loam to clay loam textured subsoil and slopes of 6 to 50 percent. The soils in this site are well drained and formed in soft siltstone, sandstone, porcelanite or alluvium. The loam to silt loam surface layer is 3 to 6 inches thick. The soils have a moderate infiltration rate. This site should show 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 very unstable but 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. Low available water capacity caused by the shallow rooting depth strongly influences the soil-water-plant relationship. Loss of the soil surface layer can result in a shift in species composition and/or production.

Major soil series correlated to this ecological site can be found in Section II of the Natural Resources Conservation Service Field Office Technical Guide or the following web sites:

North Dakota <http://www.nd.nrcs.usda.gov/>

South Dakota <http://www.sd.nrcs.usda.gov/>

Montana <http://www.mt.nrcs.usda.gov/>

**Table 4. Representative soil features**

Surface texture	(1) Loam (2) Silt loam (3) Sandy loam
Family particle size	(1) Loamy
Drainage class	Excessively drained

Permeability class	Moderate to very rapid
Soil depth	5–20 in
Surface fragment cover <=3"	0–25%
Surface fragment cover >3"	0–10%
Available water capacity (0-40in)	1–3 in
Calcium carbonate equivalent (0-40in)	0–10%
Electrical conductivity (0-40in)	0–4 mmhos/cm
Sodium adsorption ratio (0-40in)	0–4
Soil reaction (1:1 water) (0-40in)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	20–70%
Subsurface fragment volume >3" (Depth not specified)	6–65%

## Ecological dynamics

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

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

Continuous grazing without adequate recovery periods following each grazing occurrence over several years causes this site to depart from the Reference Plant Community. Species such as threadleaf sedge and blue grama will initially increase. Plains muhly, western wheatgrass, little bluestem, sideoats grama and bluebunch wheatgrass (extreme western part of MLRA 54 only) will decrease in frequency and production and later disappear. Heavy continuous grazing causes blue grama and/or threadleaf sedge to increase.

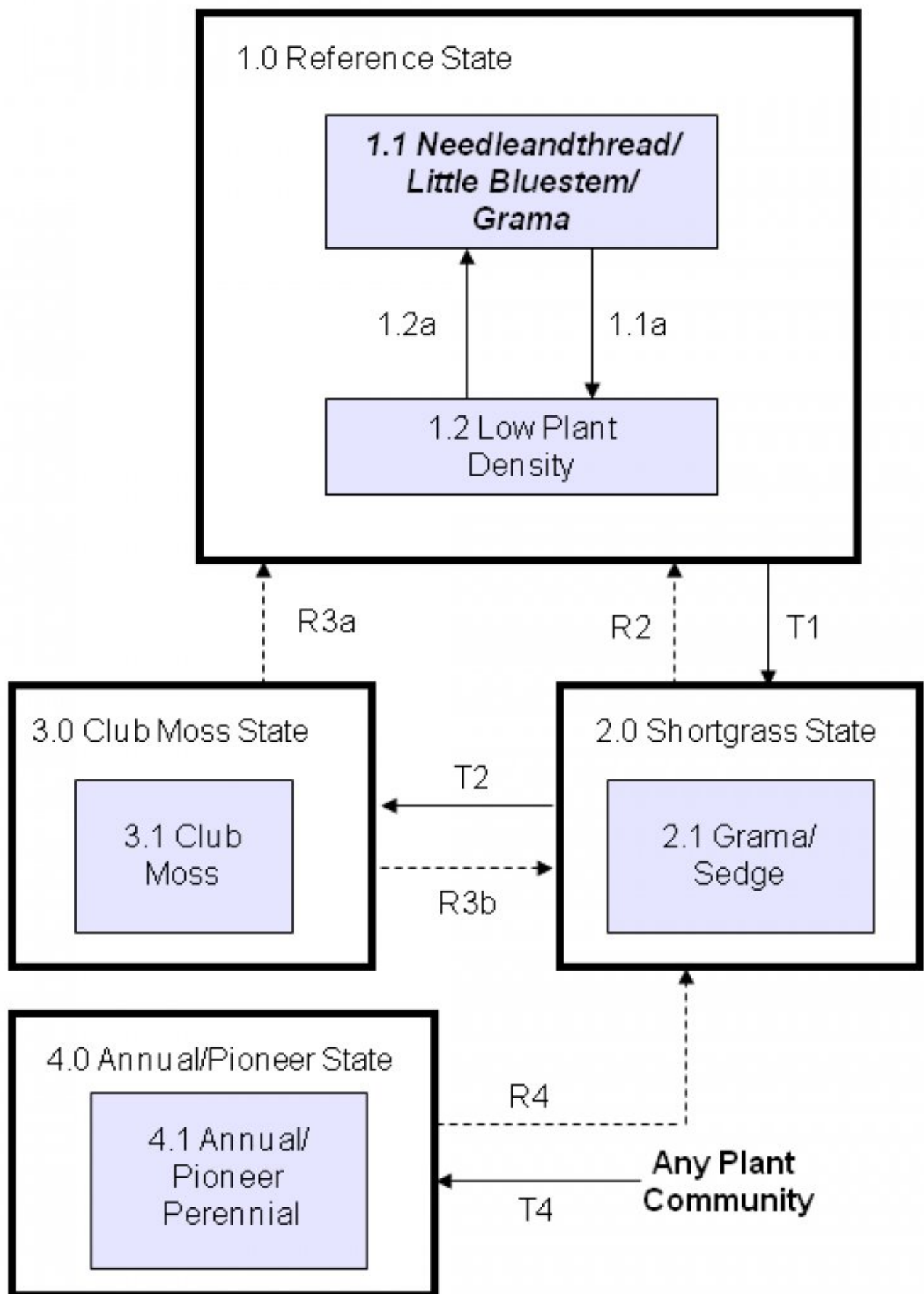
In time, heavy continuous grazing will likely cause upland sedges and blue grama to dominate and pioneer perennials, annuals, and club moss (in its range) to increase. This plant community is relatively stable and the competitive advantage prevents other species from establishing. This plant community is less productive than the Reference Plant Community. Runoff increases and infiltration will decrease. Soil erosion will be minimal. Extended periods of non-use and lack of fire will result in a plant community having low density with higher litter amounts, which favors an increase in cheatgrass, crested wheatgrass, Sandberg bluegrass and sweetclover. In time, shrubs such as cactus, creeping juniper and skunkbrush sumac will increase.

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

Following the state and transition diagram are narratives for each of the described states and community phases. These may not represent every possibility, but they are the most prevalent and repeatable states/community

phases. The plant composition tables shown below have been developed from the best available knowledge at the time of this revision. As more data are collected, some of these community phases and/or states may be revised or removed, and new ones may be added. The main purpose for including the descriptions here is to capture the current knowledge and experience at the time of this revision.

## **State and transition model**



Reference

The State narrative is under development.

Community 1.1  
Needleandthread/Little Bluestem/Grama

This is the interpretive plant community and is considered to be the Reference Plant Community. This community evolved with grazing by large herbivores and occasional prairie fire. It is well suited for grazing by domestic livestock and can be found on areas that are properly managed with prescribed grazing that allows for proper utilization, changes in season of use and adequate recovery periods following each grazing event. The potential vegetation is about 85% grasses or grass-like plants, 8% forbs, 6% shrubs and 1% cryptogams. An even mix of both cool and warm-season grasses dominates this plant community. The major grasses include needleandthread, western wheatgrass, little bluestem and both sideoats and blue grama. Other grasses occurring on the site include green needlegrass and/or porcupine grass, thickspike wheatgrass, bluebunch wheatgrass, plains muhly, red threeawn and sedges. The significant forbs include gayfeather, purple coneflower, prairie clover and cutleaf ironplant. Significant shrubs are fringed sagewort, creeping juniper and rose. This plant community is well adapted to the Northern Great Plains climatic conditions. Individual species can vary greatly in production depending on growing conditions (timing and amount of precipitation and temperature). Community dynamics, nutrient cycle, water cycle and energy flow are functioning at the sites potential. Plant litter is properly distributed with some movement off-site and natural plant mortality is low. The diversity in plant species allows for high drought tolerance.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	330	700	1075
Forb	35	52	65
Shrub/Vine	35	44	50
Moss	0	4	10
Total	400	800	1200

Figure 5. Plant community growth curve (percent production by month).  
ND5402, Missouri Slope, Native Grasslands, Cool/Warm-season Mix. Cool-  
season/warm-season dominant.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	2	6	21	40	20	6	4	1	0	0

Community 1.2  
Low Plant Density

This plant community develops after an extended period of 15 or more years of non-use by herbivores and no fire. Plant litter may accumulate as this plant community first develops. Due to a lack of tiller stimulation and sunlight, native bunchgrasses typically develop dead centers and native rhizomatous grasses are limited to colonies. Standing decadent plants and moderate litter covers shorter understory species (i.e. short grasses and sedges), restricting their ability to capture adequate sunlight for photosynthesis. Vigor and diversity of native plants are reduced. Annual and/or biennial forbs, annual grasses, and cryptogams commonly fill interspaces once occupied by desirable species. Crested wheatgrass, cheatgrass and/or sweetclover may invade this plant community. All native plants present in the Reference Plant Community may be present in this state, but in less vigor and health. The common forbs include American pasqueflower, green sagewort, gayfeather and purple coneflower. Fringed sagewort, cactus, creeping juniper and skunkbrush sumac are the principal shrubs and tend to increase in density and cover. This plant community is resistant to change without prescribed grazing. Grazing is the most effective treatment in moving this plant community towards the Reference Plant Community. Soil erosion is low. Compared to the Reference Plant Community, infiltration and runoff is similar. Once this plant community is reached, any of the preferred treatments can readily return the diversity and production of the site.

Table 6. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	300	507	760
Forb	25	45	65
Shrub/Vine	25	45	65
Moss	0	3	10
<b>Total</b>	<b>350</b>	<b>600</b>	<b>900</b>

Figure 7. Plant community growth curve (percent production by month).  
ND5406, Missouri Slope, Introduced Cool-season Grasses. Introduced cool-season grasses.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	10	35	35	5	2	8	2	0	0

### Pathway 1.1a Community 1.1 to 1.2

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

### Pathway 1.2a Community 1.2 to 1.1

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

#### Conservation practices

Prescribed Burning
Prescribed Grazing

### State 2 Shortgrass

The State narrative is under development.

### Community 2.1 Grama/Sedge

This plant community can very quickly develop from the adverse effects of long-term, heavy, continuous grazing and/or continuous seasonal grazing (annual, early spring seasonal grazing) and/or repeated wildfires. Annual, grazing too early in the spring depletes stored carbohydrates, resulting in weakening and eventual death of the cool season mid-grasses. Short grasses and forbs increase to dominate the site and annual production decreases dramatically. Lack of litter and reduced vigor result in higher soil temperatures, poor water infiltration rates, and high evapotranspiration, which gives blue grama and sedges a highly competitive advantage over cool and warm-season mid-grasses. This plant community can occur throughout the pasture, on spot grazed areas, and around water sources where season-long grazing patterns occur. Blue grama and threadleaf sedge are the dominant grass/grass-like species. Other grasses include western wheatgrass, needleandthread, little bluestem, plains muhly, prairie junegrass and red threeawn. Significant forbs include American pasqueflower, green sagewort, cutleaf ironplant, rush skeletonweed, prairie coneflower and scarlet globemallow. There is usually less than 20% bare ground. The significant shrubs include broom snakeweed, cactus and fringed sagewort. This plant community is relatively stable. The competitive advantage of blue grama and threadleaf sedge prevents other species from establishing. This plant community is less productive than the Reference Plant Community. Runoff has increases



and infiltration has decreased. Soil erosion will be minimal due to the “sod-like” habit of blue grama.

**Table 7. Annual production by plant type**

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	135	212	285
Forb	10	19	30
Shrub/Vine	5	14	20
Moss	0	5	15
<b>Total</b>	<b>150</b>	<b>250</b>	<b>350</b>

**Figure 9. Plant community growth curve (percent production by month).  
ND5405, Missouri Slope, Warm-season Short Grass. Warm-season, short  
grass dominant, and some sedge.**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	1	7	18	33	26	10	4	1	0	0

### State 3 Club Moss

The State narrative is under development.

### Community 3.1 Club Moss

This plant community typically occurs in the western portion of MLRA 54. A dense sod of club moss dominates this plant community. Club moss occupies bare soil areas within deteriorated or disturbed higher successional plant communities due to long-term repeated disturbances. Club moss cover is often 25% or greater. Club moss creates a more arid microclimate, resulting in extreme competition for available moisture. Vigor and production of other species is reduced dramatically. Grasses and grass-like plants include needleandthread, blue grama, red threeawn, Sandberg bluegrass and upland sedges. Forbs commonly found in this plant community include American pasqueflower, green sagewort, cutleaf ironplant, prairie coneflower, scarlet globemallow and scurfpea. Significant shrubs include broom snakeweed, cactus and fringed sagewort. When compared to the Reference Plant Community, blue grama, sedges and club moss have increased, while all cool and warm-season mid grasses have significantly decreased or disappeared. This plant community is very resistant to change. The thick sod and competitive advantage of both the clubmoss and the blue grama prevents other species from expanding and establishing. This plant community is far less productive than the Reference Plant Community. Initial runoff rates are low but then increase as clubmoss becomes saturated. Once clubmoss has been saturated then runoff increases and infiltration decreases as compared Reference Plant Community. Soil erosion will be minimal due to the sod forming habit of both the clubmoss and blue grama.

**Table 8. Annual production by plant type**

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	75	147	220
Moss	15	25	35
Forb	5	15	25
Shrub/Vine	5	13	20
<b>Total</b>	<b>100</b>	<b>200</b>	<b>300</b>

**Figure 11. Plant community growth curve (percent production by month).  
ND5404, Missouri Slope, Warm-season Dominant, Cool-season  
Subdominant. Short warm-season dominant, mid cool-season subdominant  
& club moss..**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	1	5	20	38	25	8	3	0	0	0

## State 4

### Annual/Pioneer

The State narrative is under development.

## Community 4.1

### Annual/Pioneer Perennial

This plant community develops under severe disturbance and/or excessive defoliation. This can result from heavy livestock or wildlife concentration, and cropping abandonment (go-back land). The dominant vegetation includes pioneer annual grasses, forbs, invaders, and early successional biennial and perennial species. Grasses may include red threeawn, sixweeks fescue, crested wheatgrass, annual brome, smooth brome, smooth brome, needleandthread, prairie junegrass and little bluestem. Forbs found may include curlycup gumweed, salsify, kochia, thistles, western ragweed, prostrate verbena and other early successional species. Shrubs that may be present include prairie rose and broom snakeweed. The community is somewhat susceptible to invasion of non-native species due to severe soil disturbances and relatively high percent of bare ground. Compared to the Reference Plant Community, little bluestem, sideoats grama, and blue grama have disappeared. This plant community is very resistant to change, as long as soil disturbance or severe vegetation defoliation persists, thus holding back secondary plant succession. Reduced surface cover, low plant density, low plant vigor, loss of root biomass, and soil compaction all contribute to decreased water infiltration, increased runoff, and accelerated erosion rates. Significant economic inputs, management and time would be required to move this plant community toward a higher successional stage and a more productive plant community. Secondary succession is highly variable, depending upon availability and diversity of a viable seed bank of higher successional species within the existing plant community and neighboring plant communities. This plant community will take a long time in order to improve the production capability, but management changes would be needed to maintain any plant community that develops. The total annual production ranges from 100 to 400 lbs./ac. (air-dry weight) depending upon growing conditions.

## Transition T1

### State 1 to 2

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

## Transition T2

### State 2 to 3

Heavy, continuous grazing will cause further deterioration resulting in a shift to the Club Moss Plant Community.

## Restoration pathway R3b

### State 3 to 2

Long-term prescribed grazing and/or prescribed burning will eventually convert this plant community to the Grama/Sedge Plant Community.

## Conservation practices

Prescribed Grazing
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## Restoration pathway R4

### State 4 to 2

Under long-term prescribed grazing and/or removal of disturbance, including adequate rest periods, this plant community will move through the successional stages, and may eventually lead to a plant community resembling

the Needleandthread/Little Bluestem/Grama Plant Community. This process will likely take a long period of time (50+ years). Depending on the slope, aspect, and size, and if adequate perennial plants exist, this change can occur more rapidly.

## Conservation practices

Prescribed Grazing

## Additional community tables

Table 9. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>Needlegrass</b>			80–160	
	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	80–160	–
2	<b>Mid Warm-Season</b>			80–160	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	80–120	–
	plains muhly	MUCU3	<i>Muhlenbergia cuspidata</i>	16–40	–
3	<b>Grama</b>			80–160	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	40–120	–
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	40–80	–
4	<b>Wheatgrass</b>			40–80	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	40–80	–
	thickspike wheatgrass	ELLAL	<i>Elymus lanceolatus ssp. lanceolatus</i>	0–40	–
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	0–16	–
5	<b>Other Native Grasses</b>			40–80	
	Fendler threeawn	ARPUL	<i>Aristida purpurea var. longiseta</i>	8–24	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	8–16	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	8–16	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	8	–
	plains reedgrass	CAMO	<i>Calamagrostis montanensis</i>	8	–
	slender wheatgrass	ELTRT	<i>Elymus trachycaulus ssp. trachycaulus</i>	8	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–8	–
6	<b>Grass-Likes</b>			16–40	
	threadleaf sedge	CAFI	<i>Carex filifolia</i>	16–40	–
	Grass-like (not a true grass)	2GL	<i>Grass-like (not a true grass)</i>	0–8	–
<b>Forb</b>					
8	<b>Forbs</b>			40–64	
	blazing star	LIATR	<i>Liatris</i>	16–24	–
	prairie clover	DALEA	<i>Dalea</i>	16–24	–
	blacksamson echinacea	ECAN2	<i>Echinacea angustifolia</i>	16–24	–
	Forb, perennial	2FP	<i>Forb, perennial</i>	8–16	–
	lacy tansyaster	MAPI	<i>Machaeranthera pinnatifida</i>	8–16	–
	large Indian breadroot	PEES	<i>Pedimelum esculentum</i>	8	–
	sniny phlox	PHHO	<i>Phlox hoodii</i>	8	–

	spring phlox	PUPA5	<i>Pulsatilla patens</i>	8	—
	upright prairie coneflower	RACO3	<i>Ratibida columnifera</i>	8	—
	scarlet globemallow	SPCO	<i>Sphaeralcea coccinea</i>	8	—
	white heath aster	SYER	<i>Symphyotrichum ericoides</i>	8	—
	rush skeletonplant	LYJU	<i>Lygodesmia juncea</i>	8	—
	onion	ALLIU	<i>Allium</i>	0–8	—
	tarragon	ARDR4	<i>Artemisia dracunculus</i>	8	—
	plains milkvetch	ASGI5	<i>Astragalus gilviflorus</i>	8	—
	alpine golden buckwheat	ERFLF	<i>Eriogonum flavum</i> var. <i>flavum</i>	8	—
	blanketflower	GAAR	<i>Gaillardia aristata</i>	8	—
	scarlet beeblossom	GACO5	<i>Gaura coccinea</i>	8	—
	Forb, annual	2FA	<i>Forb, annual</i>	8	—
<b>Shrub/Vine</b>					
9	<b>Shrubs</b>			40–48	
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	8–16	—
	kinnikinnick	ARUV	<i>Arctostaphylos uva-ursi</i>	0–8	—
	rubber rabbitbrush	ERNA10	<i>Ericameria nauseosa</i>	0–8	—
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	8	—
	creeping juniper	JUHO2	<i>Juniperus horizontalis</i>	8	—
	pricklypear	OPUNT	<i>Opuntia</i>	8	—
	skunkbush sumac	RHTR	<i>Rhus trilobata</i>	0–8	—
	rose	ROSA5	<i>Rosa</i>	8	—
	Subshrub (<.5m)	2SUBS	<i>Subshrub (&lt;.5m)</i>	0–8	—
<b>Moss</b>					
10	<b>Cryptogams</b>			0–8	
	lesser spikemoss	SEDE2	<i>Selaginella densa</i>	0–8	—

Table 10. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>Needlegrass</b>			90–120	
	needle and thread	HECOC8	<i>Hesperostipa comata</i> ssp. <i>comata</i>	90–120	—
2	<b>Mid Warm-Season</b>			30–60	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	30–60	—
	plains muhly	MUCU3	<i>Muhlenbergia cuspidata</i>	12–30	—
3	<b>Grama</b>			60–90	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	30–60	—
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	12–30	—
4	<b>Wheatgrass</b>			30–60	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	30–60	—
	thickspike wheatgrass	ELLAL	<i>Elymus lanceolatus</i> ssp. <i>lanceolatus</i>	0–30	—
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	0–12	—
5	<b>Other Native Grasses</b>			30–60	

	Fendler threeawn	ARPUL	<i>Aristida purpurea</i> var. <i>longiseta</i>	12–24	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	6–12	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	6–12	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	6	–
	plains reedgrass	CAMO	<i>Calamagrostis montanensis</i>	6	–
	slender wheatgrass	ELTRT	<i>Elymus trachycaulus</i> ssp. <i>trachycaulus</i>	6	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–6	–
6	<b>Grass-Likes</b>			30–60	
	threadleaf sedge	CAFI	<i>Carex filifolia</i>	30–60	–
	Grass-like (not a true grass)	2GL	<i>Grass-like (not a true grass)</i>	6–12	–
7	<b>Non-Native Grasses</b>			0–24	
	crested wheatgrass	AGCR	<i>Agropyron cristatum</i>	0–24	–
	cheatgrass	BRTE	<i>Bromus tectorum</i>	0–24	–
<b>Forb</b>					
8	<b>Forbs</b>			30–60	
	sweetclover	MELIL	<i>Melilotus</i>	0–30	–
	prairie clover	DALEA	<i>Dalea</i>	12–18	–
	blacksamson echinacea	ECAN2	<i>Echinacea angustifolia</i>	12–18	–
	blazing star	LIATR	<i>Liatris</i>	12–18	–
	lacy tansyaster	MAPI	<i>Machaeranthera pinnatifida</i>	6–12	–
	Forb, perennial	2FP	<i>Forb, perennial</i>	6–12	–
	onion	ALLIU	<i>Allium</i>	6	–
	tarragon	ARDR4	<i>Artemisia dracunculus</i>	6	–
	plains milkvetch	ASGI5	<i>Astragalus gilviflorus</i>	6	–
	alpine golden buckwheat	ERFLF	<i>Eriogonum flavum</i> var. <i>flavum</i>	6	–
	blanketflower	GAAR	<i>Gaillardia aristata</i>	6	–
	scarlet beeblossom	GACO5	<i>Gaura coccinea</i>	6	–
	curlycup gumweed	GRSQ	<i>Grindelia squarrosa</i>	0–6	–
	large Indian breadroot	PEES	<i>Pedimelum esculentum</i>	6	–
	spiny phlox	PHHO	<i>Phlox hoodii</i>	6	–
	woolly plantain	PLPA2	<i>Plantago patagonica</i>	0–6	–
	eastern pasqueflower	PUPA5	<i>Pulsatilla patens</i>	6	–
	upright prairie coneflower	RACO3	<i>Ratibida columnifera</i>	6	–
	scarlet globemallow	SPCO	<i>Sphaeralcea coccinea</i>	6	–
	white heath aster	SYER	<i>Symphyotrichum ericoides</i>	6	–
	common dandelion	TAOF	<i>Taraxacum officinale</i>	6	–
	yellow salsify	TRDU	<i>Tragopogon dubius</i>	6	–
	Forb, annual	2FA	<i>Forb, annual</i>	6	–
	rush skeletonplant	LYJU	<i>Lygodesmia juncea</i>	6	–
<b>Shrub/Vine</b>					
9	<b>Shrubs</b>			30–60	
	creeping juniper	JUHO2	<i>Juniperus horizontalis</i>	18–24	–

	pricklypear	OPUNT	<i>Opuntia</i>	12–18	–
	rose	ROSA5	<i>Rosa</i>	6–12	–
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	6–12	–
	kinnikinnick	ARUV	<i>Arctostaphylos uva-ursi</i>	0–6	–
	rubber rabbitbrush	ERNA10	<i>Ericameria nauseosa</i>	0–6	–
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	6	–
	Subshrub (<.5m)	2SUBS	<i>Subshrub (&lt;.5m)</i>	0–6	–
	skunkbush sumac	RHTR	<i>Rhus trilobata</i>	0–6	–
<b>Moss</b>					
10	<b>Cryptogams</b>			0–6	
	lesser spikemoss	SEDE2	<i>Selaginella densa</i>	0–6	–

Table 11. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>Needlegrass</b>			8–15	
	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	8–15	–
2	<b>Mid Warm-Season</b>			0–5	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	0–5	–
	plains muhly	MUCU3	<i>Muhlenbergia cuspidata</i>	0–3	–
3	<b>Grama</b>			50–75	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	50–75	–
	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	0–3	–
4	<b>Wheatgrass</b>			5–13	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	5–13	–
	thickspike wheatgrass	ELLAL	<i>Elymus lanceolatus ssp. lanceolatus</i>	0–3	–
5	<b>Other Native Grasses</b>			8–13	
	Fendler threeawn	ARPUL	<i>Aristida purpurea var. longiseta</i>	5–8	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	5–8	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	5–8	–
	slender wheatgrass	ELTRT	<i>Elymus trachycaulus ssp. trachycaulus</i>	3	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	3	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–3	–
6	<b>Grass-Likes</b>			50–75	
	threadleaf sedge	CAFI	<i>Carex filifolia</i>	50–75	–
	Grass-like (not a true grass)	2GL	<i>Grass-like (not a true grass)</i>	0–3	–
7	<b>Non-Native Grasses</b>			0–3	
	crested wheatgrass	AGCR	<i>Agropyron cristatum</i>	0–3	–
<b>Forb</b>					
8	<b>Forbs</b>			13–25	
	alpine golden buckwheat	ERFLF	<i>Eriogonum flavum var. flavum</i>	6–12	–
	eastern pasqueflower	PUPA5	<i>Pulsatilla patens</i>	5–8	–

	upright prairie coneflower	RACU3	<i>Ratibida columnifera</i>	5–8	–
	tarragon	ARDR4	<i>Artemisia dracunculus</i>	5–8	–
	Forb, perennial	2FP	<i>Forb, perennial</i>	3–5	–
	rush skeletonplant	LYJU	<i>Lygodesmia juncea</i>	3–5	–
	lacy tansyaster	MAPI	<i>Machaeranthera pinnatifida</i>	3–5	–
	scarlet globemallow	SPCO	<i>Sphaeralcea coccinea</i>	3–5	–
	white heath aster	SYER	<i>Symphyotrichum ericoides</i>	3–5	–
	common dandelion	TAOF	<i>Taraxacum officinale</i>	3–5	–
	curlycup gumweed	GRSQ	<i>Grindelia squarrosa</i>	3–5	–
	blazing star	LIATR	<i>Liatris</i>	3	–
	yellow salsify	TRDU	<i>Tragopogon dubius</i>	3	–
	sweetclover	MELIL	<i>Melilotus</i>	0–3	–
	large Indian breadroot	PEES	<i>Pedimelum esculentum</i>	3	–
	spiny phlox	PHHO	<i>Phlox hoodii</i>	3	–
	woolly plantain	PLPA2	<i>Plantago patagonica</i>	3	–
	onion	ALLIU	<i>Allium</i>	0–3	–
	plains milkvetch	ASGI5	<i>Astragalus gilviflorus</i>	0–3	–
	blacksamson echinacea	ECAN2	<i>Echinacea angustifolia</i>	3	–
	Forb, annual	2FA	<i>Forb, annual</i>	3	–

#### Shrub/Vine

9	<b>Shrubs</b>			10–18	
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	5–8	–
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	5–8	–
	creeping juniper	JUHO2	<i>Juniperus horizontalis</i>	5–8	–
	pricklypear	OPUNT	<i>Opuntia</i>	3–5	–
	rubber rabbitbrush	ERNA10	<i>Ericameria nauseosa</i>	0–5	–
	rose	ROSA5	<i>Rosa</i>	3	–
	Subshrub (<.5m)	2SUBS	<i>Subshrub (&lt;.5m)</i>	0–3	–

Table 12. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>Needlegrass</b>			6–12	
	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	6–12	–
2	<b>Mid Warm-Season</b>			0–4	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	0–4	–
3	<b>Grama</b>			30–50	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	30–50	–
4	<b>Wheatgrass</b>			2–6	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	2–6	–
	thickspike wheatgrass	ELLAL	<i>Elymus lanceolatus ssp. lanceolatus</i>	0–2	–
5	<b>Other Native Grasses</b>			6–12	
	Fendler threeawn	ARPUL	<i>Aristida purpurea var. longiseta</i>	4–6	–

	Sandberg bluegrass	POSE	<i>Poa secunda</i>	2–4	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	2–4	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0–2	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–2	–
6	<b>Grass-Likes</b>			30–50	
	threadleaf sedge	CAFI	<i>Carex filifolia</i>	30–50	–
	Grass-like (not a true grass)	2GL	<i>Grass-like (not a true grass)</i>	0–2	–
<b>Forb</b>					
8	<b>Forbs</b>			10–20	
	eastern pasqueflower	PUPA5	<i>Pulsatilla patens</i>	4–6	–
	upright prairie coneflower	RACO3	<i>Ratibida columnifera</i>	4–6	–
	tarragon	ARDR4	<i>Artemisia dracunculus</i>	4–6	–
	curlycup gumweed	GRSQ	<i>Grindelia squarrosa</i>	2–4	–
	Forb, perennial	2FP	<i>Forb, perennial</i>	2–4	–
	rush skeletonplant	LYJU	<i>Lygodesmia juncea</i>	2–4	–
	lacy tansyaster	MAPI	<i>Machaeranthera pinnatifida</i>	2–4	–
	large Indian breadroot	PEES	<i>Pedimelum esculentum</i>	2–4	–
	scarlet globemallow	SPCO	<i>Sphaeralcea coccinea</i>	2–4	–
	white heath aster	SYER	<i>Symphyotrichum ericoides</i>	2–4	–
	common dandelion	TAOF	<i>Taraxacum officinale</i>	2–4	–
	yellow salsify	TRDU	<i>Tragopogon dubius</i>	2	–
	spiny phlox	PHHO	<i>Phlox hoodii</i>	2	–
	woolly plantain	PLPA2	<i>Plantago patagonica</i>	2	–
	Forb, annual	2FA	<i>Forb, annual</i>	2	–
	blazing star	LIATR	<i>Liatris</i>	0–2	–
<b>Shrub/Vine</b>					
9	<b>Shrubs</b>			10–16	
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	4–6	–
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	4–6	–
	pricklypear	OPUNT	<i>Opuntia</i>	4–6	–
	rose	ROSA5	<i>Rosa</i>	0–2	–
	Subshrub (<.5m)	2SUBS	<i>Subshrub (&lt;.5m)</i>	0–2	–
	creeping juniper	JUHO2	<i>Juniperus horizontalis</i>	0–2	–
	rubber rabbitbrush	ERNA10	<i>Ericameria nauseosa</i>	0–2	–
<b>Moss</b>					
10	<b>Cryptogams</b>			20–30	
	lesser spikemoss	SEDE2	<i>Selaginella densa</i>	20–30	–

## Animal community

Animal Community – Wildlife Interpretations:  
Under development.

Animal Community – Grazing Interpretations:

This site is well adapted to managed grazing by domestic livestock. The predominance of herbaceous plants across



all plant community phases best lends these sites to grazing by cattle but other domestic grazers with differing diet preferences may also be a consideration depending upon management objectives. Often, the current plant community does not entirely match any particular plant community (as described in the ecological site description). Because of this, a resource inventory is necessary to document plant composition and production. Proper interpretation of this inventory data will permit the establishment of a safe, initial stocking rate for the type and class of animals and level of grazing management. More accurate stocking rate estimates should eventually be calculated using actual stocking rate information and monitoring data.

## **Hydrological functions**

Water is the principal factor limiting herbage production on this site. The site is dominated by soils in hydrologic group A. Infiltration varies from rapid to very rapid and runoff varies from very low to medium depending on soil hydrologic group and ground cover. In many cases, areas with greater than 75% ground cover have the greatest potential for high infiltration and lower runoff. An exception would be where short grasses form a dense sod and dominate the site. 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 varieties of plants, which bloom from spring until fall, have an esthetic value that appeals to visitors.

## **Wood products**

No appreciable wood products are present on the site.

## **Other products**

Selected seed harvest of certain unique native plant species can provide additional income.

## **Inventory data references**

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

Those involved in developing this site description include: Dennis Froemke, NRCS Range Management Specialist; Stan Boltz, NRCS Range Management Specialist; Darrell VanderBusch, Resource Soil Scientist.

Data Source Number of Records Sample Period State County

SCS-RANGE-417 6 1968 – 1970 ND Slope

Ocular estimate 2 2000 – 2001 ND Dunn, Stark

## **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.

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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.

## **Contributors**

## 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	05/24/2011
Approved by	Jeff Printz
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

- 1. Number and extent of rills:** Due to the wide slope range associated with this site, the number and extent of rills will vary from none on sites with slopes of < 9% to common on slopes > 25%.

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- 2. Presence of water flow patterns:** Due to the wide slope range associated with this site, water flow patterns will vary from barely observable on sites with slopes of < 9% from broken and irregular in appearance to continuous on slopes > 25%.

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- 3. Number and height of erosional pedestals or terracettes:** Not evident on slopes < 9%. Erosional pedestals will be present with terracettes present at debris dams on slopes > 9%.

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- 4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is 40 to 50%.

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- 5. Number of gullies and erosion associated with gullies:** Active gullies restricted to concentrated water flow patterns on steeper slopes.

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

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- 7. Amount of litter movement (describe size and distance expected to travel):** Little to no plant litter movement occurs on slopes < 9%. Litter movement does occur on slopes > 25%.

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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):** Plant cover and litter is at 50% or greater of soil surface and maintains soil surface integrity. Stability class anticipated to be 3 or greater.
- 
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Use soil series description for depth, color, and structure of A-horizon.
- 
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Plant canopy (50% maximum), moderate to rapid infiltration rates.
- 
11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** No compaction layer would be expected except for the naturally occurring rooting restriction within 10 inches of the soil surface.
- 
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, cool-season grasses > mid, warm-season bunchgrasses =
- Sub-dominant: short, warm-season grasses > mid-stature, cool season rhizomatous grasses >
- Other: forbs > shrubs = grass-likes > short, cool-season grasses
- Additional: Due to differing root structure and distribution, Kentucky bluegrass and smooth brome grass do not fit into reference plant community F/S groups.
- 
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Some plant mortality and decadence would be expected (10 – 15%).
- 
14. **Average percent litter cover (%) and depth ( in):** Litter cover is in contact with soil surface with little evidence of biological activity.
- 
15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Representative value = 800 lbs/ac with a range of 400 lbs/ac to 1200 lbs/ac (air dry weight) depending upon growing conditions
- 
16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** State and local noxious, Kentucky bluegrass, smooth brome grass, creeping juniper (JOHU2)

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17. **Perennial plant reproductive capability:** Limited due to effective moisture and seed-to-soil contact.

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