

# Ecological site R054XY032ND Subirrigated

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#### **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**

R054XY023ND	Loamy Overflow
R054XY024ND	Saline Lowland
R054XY036ND	Shallow Marsh
R054XY037ND	Wet Meadow

#### **Similar sites**

R054XY023ND	Loamy Overflow
	[Moderately well drained soils in intermittent drainage ways, swales and areas that frequently receive
	additional moisture throughout the growing season, with no apparent water table. Indicator species: big
	bluestem with western wheatgrass and green needlegrass, American licorice, and western snowberry.
	The site has no switchgrass or prairie cordgrass, less big bluestem, more green needlegrass and western
	wheatgrass; less production, no water table.]

#### Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) Andropogon gerardii

#### Physiographic features

This site occurs on gently undulating to rolling sedimentary uplands.

Landforms	<ul><li>(1) Alluvial fan</li><li>(2) Alluvial flat</li><li>(3) Flood plain</li></ul>
Flooding duration	Long (7 to 30 days)
Flooding frequency	None to occasional
Ponding frequency	None
Elevation	488–1,097 m
Slope	0–2%
Water table depth	15–183 cm
Aspect	Aspect is not a significant factor

#### Table 2. Representative physiographic features

#### **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.	Rer	oresen	ntative	climatic	features
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Frost-free period (average)	136 days
Freeze-free period (average)	157 days
Precipitation total (average)	457 mm

#### Influencing water features

**Soil features** 

The common features of soils in this site are the silt loam to fine sandy loam textured subsoils and slopes of 0 to 2 percent. The soils in this site are poorly drained and some what poorly and formed in alluvium. The fine sandy loam to silt loam surface layer is 5 to 16 inches thick. The soils have a moderately rapid to moderate infiltration rate. This site should show slight to no evidence of rills, wind scoured areas or pedestalled plants. No water flow paths are seen on this site. The soil surface is stable and intact. Sub-surface soil layers are non-restrictive to water movement and root penetration.

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	<ul><li>(1) Loam</li><li>(2) Silt loam</li><li>(3) Fine sandy loam</li></ul>
Family particle size	(1) Loamy
Drainage class	Poorly drained to somewhat poorly drained
Permeability class	Moderate to moderately rapid
Soil depth	51–152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	7.62–17.78 cm
Calcium carbonate equivalent (0-101.6cm)	0–35%
Electrical conductivity (0-101.6cm)	0–8 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–5
Soil reaction (1:1 water) (0-101.6cm)	6.1–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–40%
Subsurface fragment volume >3" (Depth not specified)	0–20%

# **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 along with the high productivity of the subirrigated plants, this site is considered stable. Under continued adverse impacts, a slow decline in vegetative vigor and composition will occur. Under favorable vegetative management treatments the site can quickly 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.

As changes occur from continuous grazing without adequate recovery opportunities between grazing events, species such as Kentucky bluegrass, western wheatgrass and Baltic rush will invade or increase. Kentucky bluegrass may eventually form a dense sod. Grasses such as big bluestem, prairie cordgrass, and switchgrass will decrease in frequency and production and can be removed from the site. Non-use and lack of fire will cause litter levels and plant decadence or mortality to increase. Under extended periods of non-use and/or lack of fire, both invading grass and forb species such as Kentucky blue, fowl bluegrass, sweetclover and possibly Canada thistle will dominate the site along with a heavy increase of shrub and trees including invading trees such as Russian olive. This will eventually result in a wooded plant community.

Due to a general invasion of exotic species (such as Kentucky bluegrass and smooth bromegrass) across the MLRA within this site, returning to the 1.1 Big Bluestem/Switchgrass/Prairie Cordgrass 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



## State 1 Reference

The State narrative is under development.

# Community 1.1 Big Bluestem/Switchgrass/Prairie Cordgrass

This is the interpretive plant community and is considered to be the Reference Plant Community. This plant community evolved with grazing by large herbivores and is well suited for grazing by domestic livestock and can be found on areas that are grazed and where the grazed plants receive adequate periods of rest during the growing season in order to recover. Historically, fires occurred infrequently but were a very important natural effect on this site. The potential vegetation is about 70% grasses and grass-likes, 10% forbs, 10% shrubs and 10% trees of the total air-dry weight. Tall warm season grasses dominate this community. The major grasses include big bluestem, switchgrass, prairie cordgrass and little bluestem. Other grasses and grass-likes occurring on the community include western wheatgrass, green needlegrass, northern reedgrass, Canada wildrye, sedges and rush species.

Key forbs include American licorice, sunflower, aster, goldenrod and mint. Shrubs and tree species that recover quickly after fire events are juneberry, western snowberry, willows, boxelder, hawthorn, chokecherry and cottonwood. This plant community is diverse, stable, productive and is well adapted to the Northern Great Plains. The high water table supplies much of the moisture for plant growth. 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 a high tolerance to a fluctuating water table. Run-off from adjacent sites and moderate or high available water capacity provides a favorable soil-water-plant relationship.

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	3043	3475	3839
Shrub/Vine	219	336	476
Tree	219	336	476
Forb	219	336	476
Total	3700	4483	5267

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

Figure 5. Plant community growth curve (percent production by month). ND5403, Missouri Slope, Native Grasslands, Warm-season dominant. Warm-season dominant.

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

## Community 1.2 Kentucky Bluegrass/Western Wheatgrass/Trees

This plant community results from continuous grazing without adequate recovery periods between each grazing event during the growing season. Recognition of this plant community will enable the land user to implement key management actions before a significant ecological threshold is crossed. Kentucky bluegrass and western wheatgrass are the dominant species. Big bluestem, green needlegrass, switchgrass and Indiangrass are greatly reduced. Forb species would include asters, goldenrod, cudweed sagewort, heath aster, wavyleaf thistle and western yarrow. Invasive forbs are sweetclover, dandelion, and possibly Canada thistle. Shrubs and tree regeneration have completely disappeared leaving little to no shrub understory beneath large trees. Plant diversity and production have been reduced. The soil remains stable. Water cycle, nutrient cycle and energy flow is slightly reduced but continues to adequately function. Water table tends to rise closer to the surface, which favors an increase of Baltic rush and common spikerush.

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

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1580	2707	3794
Forb	247	353	476
Tree	163	252	364
Shrub/Vine	28	50	73
Total	2018	3362	4707

Figure 7. Plant community growth curve (percent production by month). ND5409, Missouri Slope, Lowland, Cool-season Dominant. Lowland, cool-season dominant, tall grasses and grass-likes..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	10	37	35	5	2	8	0	0	0

## Community 1.3 Excessive Litter/Shrubs & Trees

This plant community develops after an extended period (10 to 20 years or more) of non-use and exclusion of fire. Eventually litter levels become high enough to reduce native grass vigor, diversity and density. Kentucky bluegrass flourishes in this environment and may dominate this plant community. Common forbs include Canada goldenrod, American licorice, cudweed sagewort, and dogbane. Invading forbs are Canada thistle, sweetclover and dandelion. Shrubs such as western snowberry, willow, juneberry, rose, and chokecherry will increase in density and cover. Trees species such as green ash, boxelder, cottonwood, peachleaf willow and others tend to produce a dense canopy cover shading out the grass understory. This plant community is resistant to change without prescribed grazing and fire. The combination of both grazing and fire is most effective in moving this plant community towards the Reference Plant Community. Soil erosion is low. Runoff is similar to the Reference Plant Community. Once this plant community is reached, time and external resources will be needed to see any immediate recovery.

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

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	2146	2186	2270
Tree	247	504	729
Shrub/Vine	247	420	560
Forb	163	252	364
Total	2803	3362	3923

Figure 9. 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

Continuous grazing without adequate recovery periods between grazing events will shift this plant community to the Kentucky Bluegrass/Western Wheatgrass/Trees Plant Community.

#### Pathway 1.1b Community 1.1 to 1.3

Non-use and no fire will move this plant community to the Excessive Litter/Shrub & Trees 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 Reference Plant Community. This would require long-term management with prescribed grazing and prescribed burning under controlled conditions.

#### **Conservation practices**

Prescribed Burning	
Prescribed Grazing	

Pathway 1.3a Community 1.3 to 1.1 Periodic prescribed burning along with prescribed grazing will move this plant community toward the Big Bluestem/Switchgrass/Prairie Cordgrass Plant Community. This would require long-term management with both prescribed grazing and prescribed burning under controlled conditions.

#### **Conservation practices**

Prescribed Burning Prescribed Grazing

## State 2 Invaded

The State narrative is under development.

## Community 2.1 Kentucky Bluegrass Sod/Baltic Rush

This plant community developed with heavy continuous grazing without adequate recovery periods between grazing events. Kentucky bluegrass and Baltic rush, along with fowl bluegrass and common spikerush dominate the community. Kentucky bluegrass can develop into a thick sod. Prairie cordgrass, little bluestem, Indiangrass, green needlegrass, northern reedgrass and porcupine grass have been removed. Big bluestem, switchgrass, and western wheatgrass may persist in trace amounts, greatly reduced in vigor, and in some instances, not readily seen. Western yarrow, dandelion and goldenrod have increased. Key shrubs have been severely reduced in vigor or removed completely. A few scattered old decadent trees do remain. This plant community is resistant to change due to grazing tolerance of Kentucky bluegrass. Production and diversity is significantly reduced when compared to the Reference Plant Community. Loss or reduction of cool season grasses, tall warm season grasses, and shrub component have negatively impacted energy flow and nutrient cycling. Water infiltration is reduced significantly due to the massive shallow root system "root pan", characteristic of sodbound Kentucky bluegrass. The water table has risen closer to the surface that greatly favors the rush species. It will take a very long time to restore this plant community back to the Reference Plant Community with improved management. Renovation would be very costly.

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1401	1849	2606
Forb	219	280	364
Tree	62	90	118
Shrub/Vine	_	22	50
Total	1682	2241	3138

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

Figure 11. Plant community growth curve (percent production by month). ND5406, Missouri Slope, Introduced Cool-season Grasses. Introduced cool-season grasses.

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

# State 3 Annual/Pioneer

The State narrative is under development.

Community 3.1 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 and grasslikes may include Baltic rush, common spikerush, sedges, Kentucky bluegrass, smooth bromegrass, prairie junegrass and western wheatgrass. The dominant forbs include curlycup gumweed, marestail, salsify, kochia, field bindweed, kochia, thistles, cudweed sagewort, western ragweed, pussytoes, prostrate verbena and other early successional species. Shrubs that may be present include dogwood and willow. Plant species from adjacent ecological sites may become minor components of this plant community. The community also is susceptible to invasion of other non-native species such as Canada thistle, due to severe soil disturbances and increased bare ground. Many other annual and perennial forbs, including non-native species, may invade the site. This plant community is resistant to change, as long as soil disturbance or severe vegetation defoliation persists, thus holding back secondary plant succession. Soil erosion is potentially high in this vegetation state. 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 can be renovated to improve the production capability, but management changes would be needed to maintain the new plant community. The total annual production ranges from 500 to 2000 lbs./ac. (air-dry weight) depending upon vegetative conditions.

## Transition T1 State 1 to 2

Heavy continuous grazing without adequate recovery periods between grazing events will move this plant community across an ecological threshold to the Kentucky Bluegrass Sod/Baltic Rush Plant Community.

## Restoration pathway R2 State 2 to 1

Long term prescribed grazing with adequate recovery periods following each grazing event and proper stocking over long periods of time will move this plant community toward the Kentucky Bluegrass/Western Wheatgrass/Trees Plant Community. It may eventually return to the Reference Plant Community through associated successional plant community stages assuming an adequate seed/vegetative source is available. This process may take greater than 20 years.

#### **Conservation practices**

Prescribed Grazing

# Transition T3 State 2 to 3

Excessive defoliation (i.e., areas of heavy animal concentration) or cropped go-back land with continuous grazing will convert the plant community to the Annual/Pioneer Perennial Plant Community.

# Restoration pathway R3a State 3 to 1

Under long-term prescribed grazing and removal of disturbance, including adequate rest periods, this plant community will move through the successional stages, and may eventually lead to the Big Bluestem/Switchgrass/Prairie Cordgrass Plant Community. Depending on the slope, aspect, and size, and if adequate perennial plants exist, this change can occur more rapidly. This process will likely take a long period of time (25+ years). Range seeding with deferment and prescribed grazing can convert this to a plant community resembling the Big Bluestem/Switchgrass/Prairie Cordgrass Plant Cordgrass Plant Community.

#### **Conservation practices**

# Restoration pathway R3b State 3 to 2

Heavy, continuous grazing will lead this plant community towards the Kentucky Bluegrass Sod/Baltic Rush Plant Community.

# Additional community tables

Table 9. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass	/Grasslike				
1	Tall Warm-Season			1793–2242	
	big bluestem	ANGE	Andropogon gerardii	1569–2018	_
	switchgrass	PAVI2	Panicum virgatum	224–673	_
	little bluestem	SCSC	Schizachyrium scoparium	0–224	_
	Indiangrass	SONU2	Sorghastrum nutans	45–224	_
	prairie cordgrass	SPPE	Spartina pectinata	90–224	_
2	Mid Cool-Season		• •	224–448	
	northern reedgrass	CASTI3	Calamagrostis stricta ssp. inexpansa	135–224	_
	porcupinegrass	HESP11	Hesperostipa spartea	0–135	_
	green needlegrass	NAVI4	Nassella viridula	0–135	_
	western wheatgrass	PASM	Pascopyrum smithii	90–135	_
3	Other Native Grasses	-		135–224	
	Grass, perennial	2GP	Grass, perennial	0–90	_
	Canada wildrye	ELCA4	Elymus canadensis	45–90	_
	slender wheatgrass	ELTRS	Elymus trachycaulus ssp. subsecundus	45–90	_
	slender wheatgrass	ELTRT	Elymus trachycaulus ssp. trachycaulus	45–90	_
	mat muhly	MURI	Muhlenbergia richardsonis	0–90	_
	fowl bluegrass	POPA2	Poa palustris	45–90	_
4	Grass-Likes	-		135–224	
	Pennsylvania sedge	CAPE6	Carex pensylvanica	90–135	_
	common spikerush	ELPA3	Eleocharis palustris	45–90	_
	Grass-like (not a true grass)	2GL	Grass-like (not a true grass)	45–90	-
	shortbeak sedge	CABR10	Carex brevior	45–90	_
	woolly sedge	CAPE42	Carex pellita	45–90	_
Forb		•			
6	Forbs			224–448	
	Canada goldenrod	SOCA6	Solidago canadensis	45–90	-
	white prairie aster	SYFA	Symphyotrichum falcatum	45–90	-
	Forb, perennial	2FP	Forb, perennial	0–90	_
	common varrow		Achillea millefolium	45_90	

	common yarrow				
	American licorice	GLLE3	Glycyrrhiza lepidota	45–90	_
	Maximilian sunflower	HEMA2	Helianthus maximiliani	45–90	_
	mint	MENTH	Mentha	45–90	-
	meadow zizia	ZIAP	Zizia aptera	45–90	-
	catnip	NECA2	Nepeta cataria	0–45	_
	cinquefoil	POTEN	Potentilla	0–45	_
	wood lily	LIPH	Lilium philadelphicum	0–45	_
	anemone	ANEMO	Anemone	0–45	_
	dogbane	APOCY	Apocynum	0–45	_
	Flodman's thistle	CIFL	Cirsium flodmanii	0–45	_
	northern bedstraw	GABO2	Galium boreale	0–45	_
	downy gentian	GEPU5	Gentiana puberulenta	0–45	_
	American vetch	VIAM	Vicia americana	0–45	_
Shrub	/Vine			•	
7	Shrubs			224–448	
	willow	SALIX	Salix	90–224	_
	western snowberry	SYOC	Symphoricarpos occidentalis	179–224	_
	silver buffaloberry	SHAR	Shepherdia argentea	90–179	_
	hawthorn	CRATA	Crataegus	45–135	_
	chokecherry	PRVI	Prunus virginiana	90–135	_
	Saskatoon serviceberry	AMAL2	Amelanchier alnifolia	90–135	_
	dwarf false indigo	AMNA	Amorpha nana	45–90	_
	redosier dogwood	COSE16	Cornus sericea	45–90	_
	Missouri gooseberry	RIMI	Ribes missouriense	45–90	_
	prairie rose	ROAR3	Rosa arkansana	45–90	_
	American plum	PRAM	Prunus americana	0–45	-
	western poison ivy	TORY	Toxicodendron rydbergii	0–45	-
	Subshrub (<.5m)	2SUBS	Subshrub (<.5m)	0–45	-
Tree		-			
8	Trees			224–448	
	Tree	2TREE	Tree	0–135	-
	green ash	FRPE	Fraxinus pennsylvanica	45–135	
	plains cottonwood	PODEM	Populus deltoides ssp. monilifera	0–135	
	peachleaf willow	SAAM2	Salix amygdaloides	45–135	
	boxelder	ACNE2	Acer negundo	0–45	

#### Table 10. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)	
Grass	Grass/Grasslike					
1	Tall Warm-Season			101–168		
	big bluestem	ANGE	Andropogon gerardii	67–168	-	
	switchgrass	PAVI2	Panicum virgatum	0–34	-	
	little bluestem	SCSC	Schizachyrium scoparium	0–34	_	

2	Mid Cool-Season	-		504–673	
	western wheatgrass	PASM	Pascopyrum smithii	504–673	_
	green needlegrass	NAVI4	Nassella viridula	34–67	-
	porcupinegrass	HESP11	Hesperostipa spartea	0–34	_
3	Other Native Grasses	•		101–168	
	fowl bluegrass	POPA2	Poa palustris	67–135	_
	Grass, perennial	2GP	Grass, perennial	34–67	_
	Fendler threeawn	ARPUL	Aristida purpurea var. longiseta	34–67	_
	prairie Junegrass	KOMA	Koeleria macrantha	34–67	_
	mat muhly	MURI	Muhlenbergia richardsonis	34–67	-
	slender wheatgrass	ELTRS	Elymus trachycaulus ssp. subsecundus	0–34	-
	slender wheatgrass	ELTRT	Elymus trachycaulus ssp. trachycaulus	0–34	-
4	Grass-Likes			168–336	
	common spikerush	ELPA3	Eleocharis palustris	101–168	_
	Grass-like (not a true grass)	2GL	Grass-like (not a true grass)	34–67	_
	shortbeak sedge	CABR10	Carex brevior	0–34	_
	woolly sedge	CAPE42	Carex pellita	0–34	_
	Pennsylvania sedge	CAPE6	Carex pensylvanica	0–34	_
5	Non-Native Grasses	•		841–1177	
	Kentucky bluegrass	POPR	Poa pratensis	336–1009	_
	smooth brome	BRIN2	Bromus inermis	0–841	_
	bluegrass	POA	Poa	0–168	_
	cheatgrass	BRTE	Bromus tectorum	0–67	_
Forb		•		•	
6	Forbs			269–437	
	Canada thistle	CIAR4	Cirsium arvense	0–336	_
	sweetclover	MELIL	Melilotus	34–336	_
	Forb (herbaceous, not grass nor grass-like)	2FORB	Forb (herbaceous, not grass nor grass-like)	0–168	_
	white sagebrush	ARLU	Artemisia ludoviciana	101–168	_
	cocklebur	XANTH2	Xanthium	0–168	_
	Canada goldenrod	SOCA6	Solidago canadensis	67–101	_
	white heath aster	SYER	Symphyotrichum ericoides	67–101	_
	common dandelion	TAOF	Taraxacum officinale	67–101	_
	common yarrow	ACMI2	Achillea millefolium	67–101	_
	Flodman's thistle	CIFL	Cirsium flodmanii	67–101	_
	wavyleaf thistle	CIUN	Cirsium undulatum	67–101	_
	dogbane	APOCY	Apocynum	67–101	_
	curlycup gumweed	GRSQ	Grindelia squarrosa	34–67	_
	black medick	MELU	Medicago lupulina	34–67	_
	catnip	NECA2	Nepeta cataria	34–67	_
	cinquefoil	POTEN	Potentilla	34–67	_
	northern bedstraw	GABO2	Galium boreale	34–67	_

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	Forb, perennial	2FP	Forb, perennial	0–67	-
	yellow salsify	TRDU	Tragopogon dubius	34–67	-
	white prairie aster	SYFA	Symphyotrichum falcatum	34–67	-
	anemone	ANEMO	Anemone	0–34	-
	American licorice	GLLE3	Glycyrrhiza lepidota	0–34	-
	mint	MENTH	Mentha	0–34	-
	wood lily	LIPH	Lilium philadelphicum	0–34	-
	Forb, annual	2FA	Forb, annual	0–34	_
Shrub	/Vine				
7	Shrubs			34–67	
	silver buffaloberry	SHAR	Shepherdia argentea	67–101	_
	western snowberry	SYOC	Symphoricarpos occidentalis	34–67	_
	western poison ivy	TORY	Toxicodendron rydbergii	34–67	-
	Subshrub (<.5m)	2SUBS	Subshrub (<.5m)	0–34	-
	prairie rose	ROAR3	Rosa arkansana	0–34	_
	willow	SALIX	Salix	0–34	-
Tree	•	8	•	•	
9	Trees			168–336	
	Tree	2TREE	Tree	0–168	-
	boxelder	ACNE2	Acer negundo	0–67	_
	green ash	FRPE	Fraxinus pennsylvanica	0–67	_
	plains cottonwood	PODEM	Populus deltoides ssp. monilifera	0–67	-
	peachleaf willow	SAAM2	Salix amygdaloides	0–67	-
			•	-	/

#### Table 11. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass	/Grasslike		<u>.</u>		
1	Tall Warm-Season			67–101	
	big bluestem	ANGE	Andropogon gerardii	67–101	-
	switchgrass	PAVI2	Panicum virgatum	0–34	-
	little bluestem	SCSC	Schizachyrium scoparium	0–34	-
	prairie cordgrass	SPPE	Spartina pectinata	0–34	-
2	Mid Cool-Season	-		101–135	
	green needlegrass	NAVI4	Nassella viridula	34–135	-
	western wheatgrass	PASM	Pascopyrum smithii	67–135	-
	northern reedgrass	CASTI3	Calamagrostis stricta ssp. inexpansa	0–34	-
	porcupinegrass	HESP11	Hesperostipa spartea	0–34	-
3	Other Native Grasses	•		135–269	
	fowl bluegrass	POPA2	Poa palustris	135–269	-
	slender wheatgrass	ELTRS	Elymus trachycaulus ssp. subsecundus	34–67	-
	prairie Junegrass	KOMA	Koeleria macrantha	34–67	
	mat muhly	MURI	Muhlenbergia richardsonis	0–34	_

	-		-	
	slender wheatgrass	ELTRT	Elymus trachycaulus ssp. trachycaulus	0–34
	Grass, perennial	2GP	Grass, perennial	0–34
	Fendler threeawn	ARPUL	Aristida purpurea var. longiseta	0–34
	Canada wildrye	ELCA4	Elymus canadensis	0–34
4	Grass-Likes			101–168
	Pennsylvania sedge	CAPE6	Carex pensylvanica	101–168
	common spikerush	ELPA3	Eleocharis palustris	34–67
	shortbeak sedge	CABR10	Carex brevior	34–67
	woolly sedge	CAPE42	Carex pellita	34–67
	Grass-like (not a true grass)	2GL	Grass-like (not a true grass)	0–34
5	Non-Native Grasses	•		1009–1177
	Kentucky bluegrass	POPR	Poa pratensis	336–1177
	smooth brome	BRIN2	Bromus inermis	0–673
	bluegrass	POA	Poa	0–504
	cheatgrass	BRTE	Bromus tectorum	0–168
Forb	)		<u> </u>	
6	Forbs			168–336
	Canada thistle	CIAR4	Cirsium arvense	0–235
	sweetclover	MELIL	Melilotus	34–235
	Canada goldenrod	SOCA6	Solidago canadensis	67–168
	white sagebrush	ARLU	Artemisia ludoviciana	67–101
	American licorice	GLLE3	Glycyrrhiza lepidota	67–101
	black medick	MELU	Medicago lupulina	34–67
	mint	MENTH	Mentha	34–67
	catnip	NECA2	Nepeta cataria	34–67
	cinquefoil	POTEN	Potentilla	34–67
	Flodman's thistle	CIFL	Cirsium flodmanii	34–67
	wavyleaf thistle	CIUN	Cirsium undulatum	34–67
	northern bedstraw	GABO2	Galium boreale	34–67
	Forb (herbaceous, not grass nor grass-like)	2FORB	Forb (herbaceous, not grass nor grass-like)	34–67
	common yarrow	ACMI2	Achillea millefolium	34–67
	anemone	ANEMO	Anemone	34–67
	dogbane	APOCY	Apocynum	34–67
	white heath aster	SYER	Symphyotrichum ericoides	34–67
	Maximilian sunflower	HEMA2	Helianthus maximiliani	34–67
	common dandelion	TAOF	Taraxacum officinale	34–67
	yellow salsify	TRDU	Tragopogon dubius	34–67
	American vetch	VIAM	Vicia americana	0–34
	cocklebur	XANTH2	Xanthium	0–34
	meadow zizia	ZIAP	Zizia aptera	0–34
	wood lily	LIPH	Lilium philadelphicum	0–34
	white prairie actor	OVEA	Sumphystrichum falastum	0.24

	Forb, perennial	2FP	Forb, perennial	0–34	_
	downy gentian	GEPU5	Gentiana puberulenta	0–34	_
	curlycup gumweed	GRSQ	Grindelia squarrosa	0–34	_
	Forb, annual	2FA	Forb, annual	0–34	-
Shrub	/Vine				
7	Shrubs			336–504	
	willow	SALIX	Salix	67–336	_
	silver buffaloberry	SHAR	Shepherdia argentea	67–336	_
	western snowberry	SYOC	Symphoricarpos occidentalis	67–336	_
	hawthorn	CRATA	Crataegus	101–168	_
	chokecherry	PRVI	Prunus virginiana	101–168	-
	prairie rose	ROAR3	Rosa arkansana	67–101	-
	American plum	PRAM	Prunus americana	67–101	-
	redosier dogwood	COSE16	Cornus sericea	34–101	-
	Saskatoon serviceberry	AMAL2	Amelanchier alnifolia	67–101	-
	dwarf false indigo	AMNA	Amorpha nana	34–67	-
	western poison ivy	TORY	Toxicodendron rydbergii	34–67	-
	Missouri gooseberry	RIMI	Ribes missouriense	34–67	-
	Subshrub (<.5m)	2SUBS	Subshrub (<.5m)	0–34	_
Tree	-	-			
8	Trees			336–673	
	green ash	FRPE	Fraxinus pennsylvanica	101–336	-
	plains cottonwood	PODEM	Populus deltoides ssp. monilifera	0–336	-
	peachleaf willow	SAAM2	Salix amygdaloides	101–168	_
	Tree	2TREE	Tree	0–168	_
	boxelder	ACNE2	Acer negundo	0–168	_

#### Table 12. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)			
Grass	Grasslike							
1	Tall Warm-Season			0–67				
	big bluestem	ANGE	Andropogon gerardii	22–67	-			
	switchgrass	PAVI2	Panicum virgatum	0–22	-			
2	Mid Cool-Season		112–224					
	western wheatgrass	PASM	Pascopyrum smithii	112–224	-			
3	Other Native Grasses			112–224				
	fowl bluegrass	POPA2	Poa palustris	112–224	-			
	Fendler threeawn	ARPUL	Aristida purpurea var. longiseta	45–67	-			
	prairie Junegrass	KOMA	Koeleria macrantha	45–67	-			
	mat muhly	MURI	Muhlenbergia richardsonis	45–67	-			
	Grass, perennial	2GP	Grass, perennial	0–22	-			
4	Grass-Likes			224–336				
	common spikerush	ELPA3	Eleocharis palustris	11–179	_			
				0.00	i			

	Grass-like (not a true grass)	ZGL	Grass-like (not a true grass)	0-22	—		
	shortbeak sedge	CABR10	Carex brevior	0–22	-		
5	Non-Native Grasses	-	•	673–897			
	Kentucky bluegrass	POPR	Poa pratensis	224–785	-		
	smooth brome	BRIN2	Bromus inermis	0–560	–		
	bluegrass	POA	Poa	0–112	–		
	cheatgrass	BRTE	Bromus tectorum	0–45	–		
Forb							
6	Forbs			224–336			
	cocklebur	XANTH2	Xanthium	0–224	–		
	Forb (herbaceous, not grass nor grass-like)	2FORB	Forb (herbaceous, not grass nor grass-like)	22–224	-		
	Canada thistle	CIAR4	Cirsium arvense	0–224	-		
	sweetclover	MELIL	Melilotus	45–224	-		
	white sagebrush	ARLU	Artemisia ludoviciana	112–179	-		
	Canada goldenrod	SOCA6	Solidago canadensis	67–112	-		
	white heath aster	SYER	Symphyotrichum ericoides	67–112	–		
	common dandelion	TAOF	Taraxacum officinale	67–90	-		
	Flodman's thistle	CIFL	Cirsium flodmanii	67–90	-		
	wavyleaf thistle	CIUN	Cirsium undulatum	67–90	_		
	common yarrow	ACMI2	Achillea millefolium	67–90	_		
	dogbane	APOCY	Apocynum	45–67	-		
	northern bedstraw	GABO2	Galium boreale	45–67	-		
	curlycup gumweed	GRSQ	Grindelia squarrosa	45–67	-		
	yellow salsify	TRDU	Tragopogon dubius	45–67	-		
	Forb, annual	2FA	Forb, annual	45–67	-		
	black medick	MELU	Medicago lupulina	22–45	-		
	cinquefoil	POTEN	Potentilla	22–45	-		
	white prairie aster	SYFA	Symphyotrichum falcatum	22–45	-		
	Forb, perennial	2FP	Forb, perennial	0–22	-		
Shrub/Vine							
7	Shrubs			0–45			
	silver buffaloberry	SHAR	Shepherdia argentea	22–45	–		
	western snowberry	SYOC	Symphoricarpos occidentalis	0–45	–		
	Subshrub (<.5m)	2SUBS	Subshrub (<.5m)	0–22	–		
	prairie rose	ROAR3	Rosa arkansana	0–22	-		
Tree	Tree						
8	Trees			67–112			
	Tree	2TREE	Tree	0–90			
	boxelder	ACNE2	Acer negundo	0–22			
	green ash	FRPE	Fraxinus pennsylvanica	0–22			
	plains cottonwood	PODEM	Populus deltoides ssp. monilifera	0–22	_		
	peachleaf willow	SAAM2	Salix amygdaloides	0–22	-		

## Hydrological functions

Water is not a principal factor limiting herbage production on this site. The site is dominated by soils in hydrologic groups D and B. Infiltration varies from moderately rapid to moderate, and runoff potential varies from negligible to very low 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 variety of plants which bloom from spring until fall have an esthetic value that appeals to visitors.

#### Wood products

This site has potential for wood products from trees and shrubs.

## **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 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; Jeff Printz, NRCS State Range Management Specialist; Stan Boltz, NRCS Range Management Specialist; Darrell Vanderbusch, NRCS Resource Soil Scientist; L. Michael Stirling, NRCS Range Management Specialist; Royal Handegard, NRCS Soil Conservationist; Josh Saunders, NRCS Range Management Specialist; Jody Forman, NRCS Grazing Land Management Specialist; David Dewald, NRCS State Biologist; and Brad Podoll, NRCS Biologist.

Data Source Number of Records Sample Period State County

Ocular Estimates 2 2001 ND Grant

# **Other references**

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# Contributors

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#### 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			
Approval date			
Composition (Indicators 10 and 12) based on	Annual Production		

#### Indicators

- 1. Number and extent of rills: Rills should not be present.
- 2. Presence of water flow patterns: Barely observable.
- 3. Number and height of erosional pedestals or terracettes: Essentially non-existent.
- 4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground): Bare ground is less than 5%.
- 5. Number of gullies and erosion associated with gullies: Active gullies should not 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): Little to no plant litter movement. Plant litter remains in place and is not moved by erosional forces.
- 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 95% or greater of soil surface and maintains soil surface integrity. Stability class anticipated to be 5 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.

**distribution on infiltration and runoff:** High grass canopy and basal cover and small gaps between plants should reduce raindrop impact and slow overland flow, providing increased time for infiltration to occur. Healthy, deep rooted native grasses enhance infiltration and reduce runoff.

- 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 should be evident.
- 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: Tall, rhizomatous warm-season grass >

Sub-dominant: mid, cool-season bunchgrasses >

Other: mid, cool-season rhizomatous grasses > forbs = shrubs = trees > grass-likes

Additional: Due to differing root structure and distribution, Kentucky bluegrass and smooth bromegrass 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): Very low.
- 14. Average percent litter cover (%) and depth ( in): Litter cover is in contact with soil surface.
- 15. Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annualproduction): Representative value = 4000 lbs/ac with a range of 3300 lbs/ac to 4700 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, smooth bromegrass, Kentucky bluegrass, Russian olive
- 17. Perennial plant reproductive capability: All species are capable of reproducing.