

# Ecological site R063AY003SD Subirrigated

Accessed: 05/05/2024

## 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.

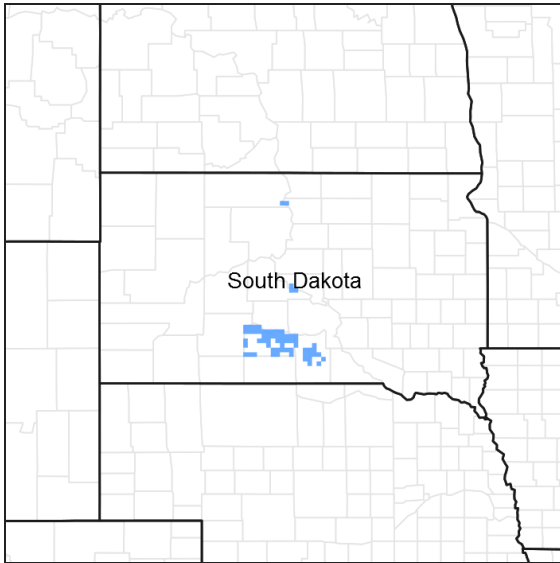


Figure 1. Mapped extent

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.

## MLRA notes

Major Land Resource Area (MLRA): 063A–Northern Rolling Pierre Shale Plains

MLRA 63A is approximately 10,160 square miles in size, the majority of which is in South Dakota and a very small portion in North Dakota. The MLRA extends west of the northern half of the South Dakota reach of the Missouri River. All five of the major rivers draining western South Dakota cross this area. From north to south, these are the Grand, Moreau, Cheyenne, Bad, and White Rivers.

Elevation range from 1,300 to 1,640 feet on the bottom land along the Missouri River to 1,640 to 2,950 feet on the shale plain uplands. Cretaceous Pierre Shale underlies almost all of this area. This is a marine sediment having layers of volcanic ash that has been altered to smectitic clays. These clays shrink as they dry and swell as they get wet. Tertiary and Quaternary river deposits, remnants of erosion from the Black Hills uplift, cap isolated highlands in this area. Deposits of alluvial sand and gravel occur on the valley floors adjacent to the major streams in the area. The average annual precipitation in this area is 15 to 20 inches.

The vegetation in this area is a transition from eastern tall grass prairie to a western mixed grass prairie, (USDA-NRCS, Ag Handbook 296).

## Classification relationships

Land Resource Region (LRR): G - Western Great Plains Range and Irrigated Region, Major Land Resource Area

(MLRA): 63A Northern Rolling Pierre Shale Plains, (USDA-NRCS, Ag Handbook 296).

Level IV Ecoregions of the Conterminous United States, 2013: 43c – River Breaks and 43f – Subhumid Pierre Shale Plains.

## Ecological site concept

The Subirrigated Ecological Site occurs throughout MLRA 63A. It is a run-in site located on floodplains and low stream terraces. Slopes range from 0 to 4 percent. The soils are formed in sandy alluvium, are moderately well to poorly drained and have a water table that fluctuates between 2 and 5 feet. Vegetation in reference consists of both warm- and cool-season grasses, sedges, and a few shrubs and trees.

## Associated sites

R063AY002SD	<b>Wet Land</b>
R063AY007SD	<b>Saline Lowland</b>
R063AY020SD	<b>Loamy Overflow</b>
R063AY021SD	<b>Clayey Overflow</b>

## Similar sites

R063AY002SD	<b>Wet Land</b> Wet Land [higher production; more frequent ponding and higher water table]
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Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Andropogon gerardii</i> (2) <i>Pascopyrum smithii</i>

## Physiographic features

This site occurs on gently undulating to rolling sedimentary uplands, low stream terraces and floodplains.

Table 2. Representative physiographic features

Landforms	(1) Stream terrace (2) Flood plain
Flooding duration	Very brief (4 to 48 hours)
Flooding frequency	None to rare
Elevation	488–823 m
Slope	0–4%
Water table depth	61–152 cm
Aspect	Aspect is not a significant factor

## Climatic features

MLRA 63A is considered to have a continental climate – cold winters and hot summers, low humidity, light rainfall, and abundant sunshine. Extreme temperature fluctuations are also common. The climate is the result of this MLRA's location near the geographic center of North America. There are few natural barriers on the Northern Great Plains and air masses move freely across the plains and account for rapid changes in temperature.

Annual precipitation ranges from 16 to 20 inches per year. The average annual temperature is about 47°F. January

is the coldest month with average temperatures ranging from about 11°F (Pollock, South Dakota (SD)), to about 22°F (Cedar Butte, SD). July is the warmest month with temperatures averaging from about 72°F (Pollock, SD), to about 76° F (Cedar Butte, SD). The range of normal average monthly temperatures between the coldest and warmest months is about 58°F. This large annual range attests to the continental nature of this area'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 cool-season plants begins in early to mid-March, slowing or ceasing in late June. Warm-season plants begin growth about mid-May and continue to early or mid-September. Green up of cool-season plants may occur in September and October when adequate soil moisture is present.

**Table 3. Representative climatic features**

Frost-free period (average)	130 days
Freeze-free period (average)	151 days
Precipitation total (average)	483 mm

### Climate stations used

- (1) POLLOCK [USC00396712], Pollock, SD
- (2) CEDAR BUTTE 1NE [USC00391539], White River, SD
- (3) COTTONWOOD 2 E [USC00391972], Kadoka, SD
- (4) KENNEBEC [USC00394516], Kennebec, SD

### Influencing water features

Description based on Cowardin, et. al., 1979.

Subirrigated site will have a permanent water table within 2 to 5 feet of the surface.

### Soil features

The common features of soils in this site are the stratified loamy fine sand or very fine sand textured subsoil and slopes of 0 to 4 percent. The soils in this site are moderately well drained and formed in sandy alluvium. The loamy fine sand surface layer is 4 to 9 inches thick. The soils have a moderately rapid infiltration rate. This site should show no evidence of rills, wind scoured areas or pedestalled plants. The soil surface is stable and intact. Sub-surface soil layers are non-restrictive to water movement and root penetration.

These soils are not susceptible to water erosion. There is little to inhibit a very productive plant community on this site. Some species that are not adapted to an occasional high water table may not be adapted, but generally the soils support a diverse and productive plant community.

Soil correlated to the Subirrigated Ecological Site: Meckling, Orwet, and Arveson

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

**Table 4. Representative soil features**

Parent material	(1) Alluvium–sandstone
Surface texture	(1) Loamy fine sand
Family particle size	(1) Sandy
Drainage class	Moderately well drained
Permeability class	Moderately rapid

Soil depth	203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	7.62–10.16 cm
Calcium carbonate equivalent (0-101.6cm)	1–10%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

## 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.

As this site deteriorates from a combination of frequent and severe grazing, species such as Kentucky bluegrass, rush, sedge and other various grass-likes will increase forming a cool-season dominated plant community. Kentucky bluegrass will eventually become sod-bound. Grasses such as big bluestem, prairie cordgrass and switchgrass will decrease in frequency and production and can eventually be removed from the site. As the site continues to deteriorate, bare ground may increase depending on water table depth. Kentucky bluegrass will persist in a broken sod appearance. Excessive litter, decadence and plant mortality can result from the lack of fire or non-use.

The plant community upon which interpretations are primarily based is the Big Bluestem-Switchgrass-Indiangrass-Little Bluestem Plant Community, which is considered to be reference plant community (1.1). 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.

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

# SUBIRRIGATED - R063AY003SD 6/24/16

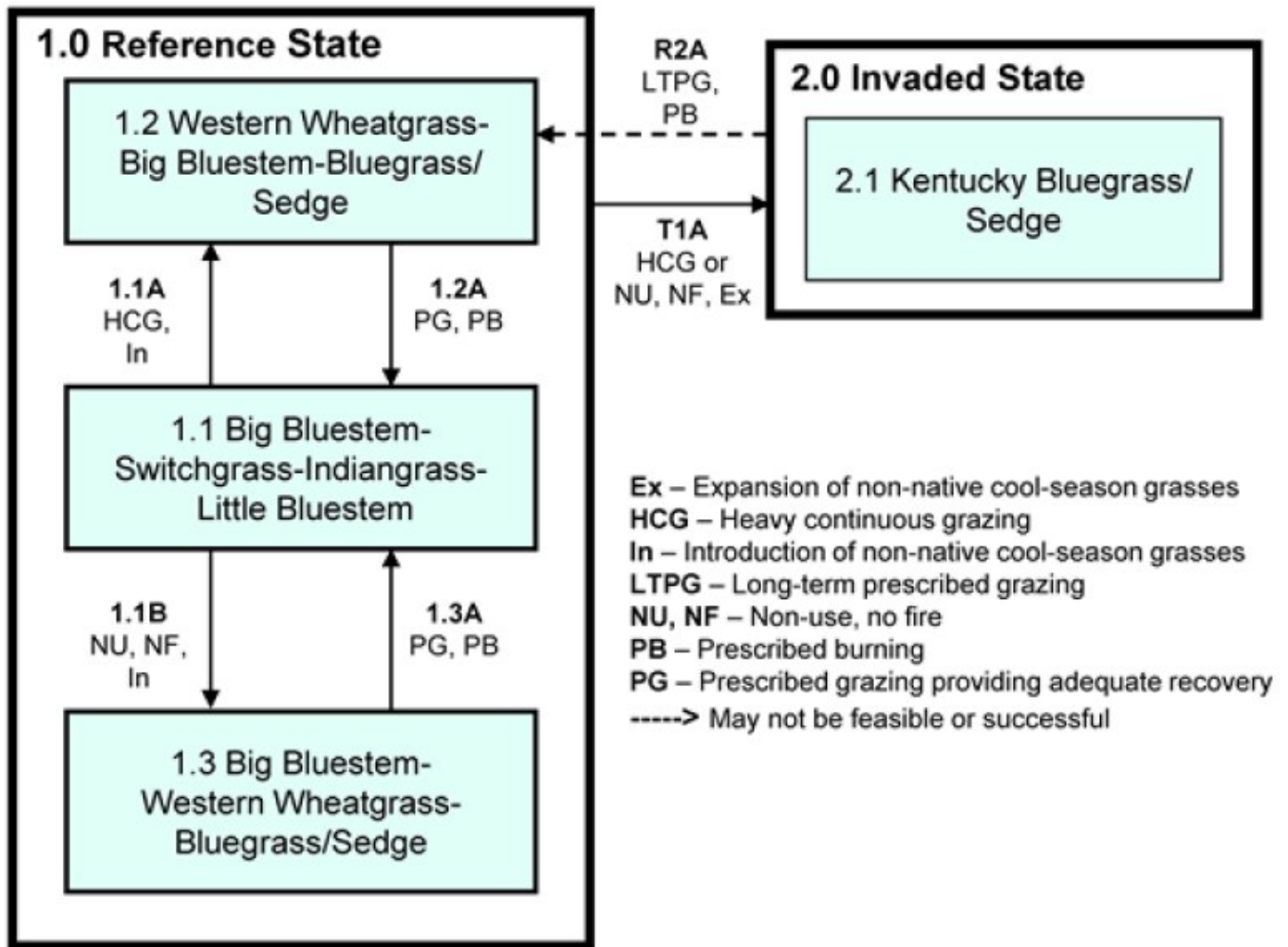


Figure 6. Subirrigated - R063AY003SD

Diagram Legend - Subirrigated - R063AY003SD		
T1A	Heavy continuous grazing without change in season of use or adequate recovery time or No use and No fire, expansion of non-native cool-season grasses.	
R2A	Long-term prescribed grazing with change in season of use and adequate recovery, and possibly prescribed burning. Recovery may not be fast and/or meet management goals.	
CP 1.1A	1.1 - 1.2	Heavy continuous grazing without adequate recovery, introduction of non-native cool-season grasses.
CP 1.1B	1.1 - 1.3	No use and no fire, introduction of non-native cool-season grasses.
CP 1.2A	1.2 - 1.1	Prescribed grazing including change in season of use, proper stocking and adequate time for rest and recovery and possibly prescribed fire.
CP 1.3A	1.3 - 1.1	Prescribed grazing including change in season of use, proper stocking and adequate time for rest and recovery and possibly prescribed fire.

Figure 7. Subirrigated - R063AY003SD

## Reference State

This State represents what is believed to show the natural range of variability that dominated the dynamics of the ecological site prior to European settlement. This site, in reference, is dominated by native warm- and cool-season grasses, forbs and shrubs. Trace amounts of non-native species, including Kentucky bluegrass and smooth brome may be present but are not prevalent. During wet years the plant community will respond to a higher water table and grass-like species will increase. During dryer years the plant community will be dominated by grasses. Grassing pressure on this site and surrounding sites also influence the plant community dynamics. Heavy grazing will reduce the amount of tall warm-season grasses and increase non-native cool-season grasses. Conversely no use and no fire will cause an increase in litter and an increase in non-native cool-season grasses.

## Community 1.1

### Big Bluestem-Switchgrass-Indiangrass-Little Bluestem Plant Community



Interpretations are based primarily on the Big Bluestem-Switchgrass-Indiangrass-Little Bluestem Plant Community (this is also considered to be 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. The potential vegetation is about 80 to 95 percent grasses and grass-likes, 5 to 10 percent forbs, and 5 to 10 percent shrubs. Tall warm season grasses dominate this community. The major grasses include big bluestem, switchgrass, Indiangrass, and little bluestem. Other grasses and grass-likes occurring on the community include western wheatgrass, prairie cordgrass, slender wheatgrass and sedges. Key forbs include American licorice, goldenrod, Maximilian sunflower, prairie clover, and white prairie aster. Shrub species include willow, silver buffaloberry, and false indigo. 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.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	4024	4573	4999
Shrub/Vine	230	404	639
Forb	230	404	639
<b>Total</b>	<b>4484</b>	<b>5381</b>	<b>6277</b>

Figure 9. Plant community growth curve (percent production by month). SD6310, Pierre Shale Plains, Lowland, Warm-season dominant. Warm-season dominant, lowland..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	2	8	15	21	26	15	8	5	0	0

## Community 1.2

### Western Wheatgrass-Big Bluestem-Bluegrass/Sedge Plant Community

This plant community results from frequent and severe defoliation. The potential vegetation is about 80 to 90 percent grasses or grass-like plants, 5 to 15 percent forbs, and 1 to 5 percent woody plants. Western wheatgrass, big bluestem, sedge and Kentucky bluegrass are the dominant species. Other grasses include slender wheatgrass, inland saltgrass, and foxtail barley. Forb species would include cudweed sagewort, goldenrod, showy milkweed, western ragweed, and white prairie aster. Compared to the Big Bluestem-Switchgrass-Indiangrass-Little Bluestem Plant Community, switchgrass, Indiangrass, little bluestem, and prairie cordgrass have decreased. Western wheatgrass, sedge, and Kentucky bluegrass have increased.

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	3138	3706	4147
Forb	185	426	768
Shrub/Vine	39	128	241
<b>Total</b>	<b>3362</b>	<b>4260</b>	<b>5156</b>

Figure 11. Plant community growth curve (percent production by month).  
SD6308, Pierre Shale Plains, lowland cool-season/warm-season codominant.  
Cool-season, warm-season codominant, lowland..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	4	11	19	23	20	12	6	5	0	0

## Community 1.3

### Big Bluestem-Western Wheatgrass-Bluegrass/Sedge Plant Community

This plant community is the result of non-use and/or no fire. This plant community is made up of 80 to 90 percent grass and grass-like species, 5 to 10 percent forbs, and 5 to 10 percent shrubs. Western wheatgrass, big bluestem, Kentucky bluegrass and sedge are the dominant species. Other grasses and grass-likes include slender wheatgrass, smooth bromegrass, and rush. Forb species would include cudweed sagewort, goldenrod, and showy milkweed. Common shrubs are rose and western snowberry. Plant diversity and production have been reduced compared to the climax community. 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 rush and spikerush.

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	3194	3811	4315
Shrub/Vine	196	336	532
Forb	196	336	532
<b>Total</b>	<b>3586</b>	<b>4483</b>	<b>5379</b>

Figure 13. Plant community growth curve (percent production by month).  
SD6308, Pierre Shale Plains, lowland cool-season/warm-season codominant.  
Cool-season, warm-season codominant, lowland..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	4	11	19	23	20	12	6	5	0	0

**Pathway 1.1A**  
**Community 1.1 to 1.2**

Heavy continuous grazing without adequate recovery time will move this plant community to the Western Wheatgrass-Big Bluestem-Bluegrass/Sedge Plant Community (1.2).

**Pathway 1.1B**  
**Community 1.1 to 1.3**

Non-use and/or no fire will shift this plant community to the Big Bluestem-Western Wheatgrass-Bluegrass/Sedge Plant Community (1.3).

**Pathway 1.2A**  
**Community 1.2 to 1.1**

Prescribed grazing, and possibly in concurrence with prescribed burning will convert this plant community to the Big Bluestem-Switchgrass-Indiangrass-Little Bluestem Plant Community (1.1).

**Conservation practices**

Prescribed Grazing
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**Pathway 1.3A**  
**Community 1.3 to 1.1**

Under prescribed grazing and/or prescribed burning, including adequate rest periods, this plant community will move towards the Big Bluestem-Switchgrass-Indiangrass-Little Bluestem Plant Community (1.1).

**Conservation practices**

Prescribed Burning
Prescribed Grazing

**State 2**  
**Invaded State**

This state has been invaded and is dominated by non-native invasive cool-season species. Kentucky bluegrass occurs on this site and drives the successional process. Preliminary studies would indicate that a threshold may exist when Kentucky bluegrass exceeds 30% of the plant community and native grasses represent less than 40% of the plant community composition. Plant communities dominated by Kentucky bluegrass have significantly less cover and diversity of native grasses and forb species (Toledo, D. et al., 2014). Hoof action during wet periods can potentially cause soil compaction and reduce rooting depth and soil saturation levels. Heavy animal concentrations or cropping on the surrounding landscapes can increase runoff and sedimentation.

**Community 2.1**  
**Kentucky Bluegrass/Sedge**

This plant community developed from species due to heavy continuous grazing or no use and no fire and expansion of non-native cool-season grasses. The plant community is predominantly cool season grasses and grass-like. Kentucky bluegrass has fully invaded the community and persists in a sod-bound condition. Sedge and foxtail barley have increased. Remnant amounts of western wheatgrass may still persist in localized colonies. Prairie cordgrass, Indiangrass, and switchgrass have been removed. Forbs such as cudweed sagewort, goldenrod, and



western ragweed are common to this site. This community remains stable but has lost much of its production and diversity. The nutrient cycle is impaired due to the loss of warm season grass species, deep-rooted forbs and shrubs. Soil compaction can be a concern if continuously grazed during wet cycles. It will take a long time to bring this plant community back to the Reference State with management alone. Renovation would be very costly.

Table 8. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	2074	2809	3503
Forb	140	235	359
Shrub/Vine	28	94	174
<b>Total</b>	<b>2242</b>	<b>3138</b>	<b>4036</b>

Figure 15. Plant community growth curve (percent production by month). SD6306, Pierre Shale Plains, lowland cool-season dominant.. Cool-season dominant, lowland..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	6	15	20	26	17	9	4	3	0	0

## Transition 1 State 1 to 2

Heavy continuous grazing, or no use and no fire and expansion of non-native cool-season grasses will convert this plant community to the Kentucky Bluegrass/Sedge Plant Community. The transition is most likely to occur from either Plant Community Phase 1.2 or 1.3.

## Restoration pathway 2A State 2 to 1

Long-term prescribed grazing and possibly prescribed burning will move this plant community to the Western Wheatgrass-Big Bluestem-Bluegrass/Sedge Plant Community (1.2). It could potentially will return to the reference plant community (1.1), assuming an adequate seed/vegetative source is available. This process will require a long period of time and may be difficult to attain depending on the degree of degradation.

### Conservation practices

Prescribed Grazing
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## Additional community tables

Table 9. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>Tall/Mid Warm-Season Grasses</b>			1614–3228	
	big bluestem	ANGE	<i>Andropogon gerardii</i>	1076–2421	–
	switchgrass	PAVI2	<i>Panicum virgatum</i>	269–807	–
	Indiangrass	SONU2	<i>Sorghastrum nutans</i>	269–807	–
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	108–538	–
	prairie cordgrass	SPPE	<i>Spartina pectinata</i>	54–430	–
	marsh muhly	MURA	<i>Muhlenbergia racemosa</i>	0–269	–
2	<b>Tall/Mid Cool-Season Grasses</b>			269–1076	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	108–807	

	western wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	54-430	-
	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	54-430	-
	Canada wildrye	ELCA4	<i>Elymus canadensis</i>	0-269	-
	green needlegrass	NAVI4	<i>Nassella viridula</i>	0-161	-
3	<b>Other Native Grasses</b>			54-538	
	Graminoid (grass or grass-like)	2GRAM	<i>Graminoid (grass or grass-like)</i>	0-269	-
	saltgrass	DISP	<i>Distichlis spicata</i>	54-269	-
	foxtail barley	HOJU	<i>Hordeum jubatum</i>	0-269	-
	fowl bluegrass	POPA2	<i>Poa palustris</i>	0-161	-
4	<b>Grass-likes</b>			108-538	
	sedge	CAREX	<i>Carex</i>	108-538	-
	Grass-like (not a true grass)	2GL	<i>Grass-like (not a true grass)</i>	0-269	-
	spikerush	ELEOC	<i>Eleocharis</i>	0-161	-
	rush	JUNCU	<i>Juncus</i>	0-161	-
<b>Forb</b>					
6	<b>Forbs</b>			269-538	
	Forb, native	2FN	<i>Forb, native</i>	0-269	-
	Maximilian sunflower	HEMA2	<i>Helianthus maximiliani</i>	54-215	-
	goldenrod	SOLID	<i>Solidago</i>	54-161	-
	American licorice	GLLE3	<i>Glycyrrhiza lepidota</i>	0-161	-
	blazing star	LIATR	<i>Liatris</i>	54-108	-
	white prairie aster	SYFA	<i>Symphyotrichum falcatum</i>	54-108	-
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	54-108	-
	showy milkweed	ASSP	<i>Asclepias speciosa</i>	54-108	-
	false boneset	BREU	<i>Brickellia eupatorioides</i>	0-108	-
	prairie clover	DALEA	<i>Dalea</i>	54-108	-
	Virginia strawberry	FRVI	<i>Fragaria virginiana</i>	0-54	-
	Rocky Mountain iris	IRMI	<i>Iris missouriensis</i>	0-54	-
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	0-54	-
	marsh arrowgrass	TRPA28	<i>Triglochin palustris</i>	0-54	-
	Pennsylvania smartweed	POPE2	<i>Polygonum pennsylvanicum</i>	0-54	-
	Missouri goldenrod	SOMI2	<i>Solidago missouriensis</i>	0-54	-
	Pursh seepweed	SUCA2	<i>Suaeda calceoliformis</i>	0-54	-
<b>Shrub/Vine</b>					
7	<b>Shrubs</b>			269-538	
	willow	SALIX	<i>Salix</i>	54-430	-
	silver buffaloberry	SHAR	<i>Shepherdia argentea</i>	0-215	-
	Shrub (>.5m)	2SHRUB	<i>Shrub (&gt;.5m)</i>	0-161	-
	false indigo bush	AMFR	<i>Amorpha fruticosa</i>	54-108	-
	rose	ROSA5	<i>Rosa</i>	0-108	-
	western snowberry	SYOC	<i>Symphoricarpos occidentalis</i>	0-108	-

Table 10. Community 1.2 plant community composition

				Annual Production	Foliar Cover
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Group	Common Name	Symbol	Scientific Name	(Kg/Hectare)	(%)
<b>Grass/Grasslike</b>					
1	<b>Tall/Mid Warm-Season Grasses</b>			213–852	
	big bluestem	ANGE	<i>Andropogon gerardii</i>	213–852	–
	switchgrass	PAVI2	<i>Panicum virgatum</i>	0–213	–
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	0–213	–
	Indiangrass	SONU2	<i>Sorghastrum nutans</i>	0–213	–
	prairie cordgrass	SPPE	<i>Spartina pectinata</i>	0–128	–
2	<b>Tall/Mid Cool-Season Grasses</b>			852–1704	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	639–1491	–
	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	85–426	–
	green needlegrass	NAVI4	<i>Nassella viridula</i>	0–128	–
	Canada wildrye	ELCA4	<i>Elymus canadensis</i>	0–128	–
3	<b>Other Native Grasses</b>			85–426	
	saltgrass	DISP	<i>Distichlis spicata</i>	43–341	–
	foxtail barley	HOJU	<i>Hordeum jubatum</i>	0–298	–
	Graminoid (grass or grass-like)	2GRAM	<i>Graminoid (grass or grass-like)</i>	0–213	–
	fowl bluegrass	POPA2	<i>Poa palustris</i>	0–128	–
4	<b>Grass-likes</b>			213–639	
	sedge	CAREX	<i>Carex</i>	213–639	–
	rush	JUNCU	<i>Juncus</i>	43–213	–
	Grass-like (not a true grass)	2GL	<i>Grass-like (not a true grass)</i>	0–213	–
	spikerush	ELEOC	<i>Eleocharis</i>	0–128	–
5	<b>Non-Native Grasses</b>			43–426	
	Kentucky bluegrass	POPR	<i>Poa pratensis</i>	43–426	–
	smooth brome	BRIN2	<i>Bromus inermis</i>	0–213	–
<b>Forb</b>					
6	<b>Forbs</b>			213–639	
	goldenrod	SOLID	<i>Solidago</i>	43–341	–
	Forb, native	2FN	<i>Forb, native</i>	0–341	–
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	43–213	–
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	43–213	–
	Forb, introduced	2FI	<i>Forb, introduced</i>	0–213	–
	white prairie aster	SYFA	<i>Symphyotrichum falcatum</i>	43–213	–
	showy milkweed	ASSP	<i>Asclepias speciosa</i>	43–128	–
	American licorice	GLLE3	<i>Glycyrrhiza lepidota</i>	0–128	–
	Maximilian sunflower	HEMA2	<i>Helianthus maximiliani</i>	0–85	–
	Rocky Mountain iris	IRMI	<i>Iris missouriensis</i>	0–85	–
	blazing star	LIATR	<i>Liatris</i>	43–85	–
	prairie clover	DALEA	<i>Dalea</i>	43–85	–
	Missouri goldenrod	SOMI2	<i>Solidago missouriensis</i>	43–85	–
	Pursh seepweed	SUCA2	<i>Suaeda calceoliformis</i>	0–43	–
	Pennsylvania smartweed	POPE2	<i>Polygonum pennsylvanicum</i>	0–43	–

	false boneset	BREU	<i>Brickellia eupatorioides</i>	0–43	–
	marsh arrowgrass	TRPA28	<i>Triglochin palustris</i>	0–43	–
<b>Shrub/Vine</b>					
7	<b>Shrubs</b>			43–213	
	rose	ROSA5	<i>Rosa</i>	43–128	–
	willow	SALIX	<i>Salix</i>	0–128	–
	western snowberry	SYOC	<i>Symphoricarpos occidentalis</i>	0–128	–
	Shrub (>.5m)	2SHRUB	<i>Shrub (&gt;.5m)</i>	0–85	–
	silver buffaloberry	SHAR	<i>Shepherdia argentea</i>	0–43	–

Table 11. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>Tall/Mid Warm-Season Grasses</b>			224–1345	
	big bluestem	ANGE	<i>Andropogon gerardii</i>	224–1345	–
	switchgrass	PAVI2	<i>Panicum virgatum</i>	0–224	–
	prairie cordgrass	SPPE	<i>Spartina pectinata</i>	0–224	–
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	0–135	–
	Indiangrass	SONU2	<i>Sorghastrum nutans</i>	0–135	–
2	<b>Tall/Mid Cool-Season Grasses</b>			673–1569	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	448–1345	–
	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	90–448	–
	green needlegrass	NAVI4	<i>Nassella viridula</i>	0–224	–
	Canada wildrye	ELCA4	<i>Elymus canadensis</i>	0–135	–
3	<b>Other Native Grasses</b>			0–224	
	Graminoid (grass or grass-like)	2GRAM	<i>Graminoid (grass or grass-like)</i>	0–224	–
	foxtail barley	HOJU	<i>Hordeum jubatum</i>	0–224	–
	fowl bluegrass	POPA2	<i>Poa palustris</i>	0–224	–
	saltgrass	DISP	<i>Distichlis spicata</i>	0–135	–
4	<b>Grass-likes</b>			224–673	
	sedge	CAREX	<i>Carex</i>	224–673	–
	rush	JUNCU	<i>Juncus</i>	45–359	–
	spikerush	ELEOC	<i>Eleocharis</i>	0–224	–
	Grass-like (not a true grass)	2GL	<i>Grass-like (not a true grass)</i>	0–224	–
5	<b>Non-Native Grasses</b>			224–897	
	Kentucky bluegrass	POPR	<i>Poa pratensis</i>	224–897	–
	smooth brome	BRIN2	<i>Bromus inermis</i>	0–359	–
<b>Forb</b>					
6	<b>Forbs</b>			224–448	
	Forb, introduced	2FI	<i>Forb, introduced</i>	0–224	–
	Forb, native	2FN	<i>Forb, native</i>	0–224	–
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	45–179	–
	showy milkweed	ASSP	<i>Asclepias speciosa</i>	45–179	–

	goldenrod	SOLID	<i>Solidago</i>	45–179	–
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	45–135	–
	American licorice	GLLE3	<i>Glycyrrhiza lepidota</i>	0–135	–
	white prairie aster	SYFA	<i>Symphyotrichum falcatum</i>	45–135	–
	Maximilian sunflower	HEMA2	<i>Helianthus maximiliani</i>	0–90	–
	prairie clover	DALEA	<i>Dalea</i>	45–90	–
	Missouri goldenrod	SOMI2	<i>Solidago missouriensis</i>	45–90	–
	blazing star	LIATR	<i>Liatris</i>	45–90	–
	Pennsylvania smartweed	POPE2	<i>Polygonum pensylvanicum</i>	0–45	–
	Pursh seepweed	SUCA2	<i>Suaeda calceoliformis</i>	0–45	–
	Virginia strawberry	FRVI	<i>Fragaria virginiana</i>	0–45	–
	Rocky Mountain iris	IRMI	<i>Iris missouriensis</i>	0–45	–
	false boneset	BREU	<i>Brickellia eupatorioides</i>	0–45	–
	marsh arrowgrass	TRPA28	<i>Triglochin palustris</i>	0–45	–
<b>Shrub/Vine</b>					
7	<b>Shrubs</b>			224–448	
	willow	SALIX	<i>Salix</i>	0–224	–
	western snowberry	SYOC	<i>Symphoricarpos occidentalis</i>	45–224	–
	silver buffaloberry	SHAR	<i>Shepherdia argentea</i>	0–179	–
	rose	ROSA5	<i>Rosa</i>	45–135	–
	Shrub (>.5m)	2SHRUB	<i>Shrub (&gt;.5m)</i>	0–135	–
	false indigo bush	AMFR	<i>Amorpha fruticosa</i>	0–90	–

Table 12. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>Tall/Mid Warm-Season Grasses</b>			0–157	
	big bluestem	ANGE	<i>Andropogon gerardii</i>	0–157	–
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	0–94	–
2	<b>Tall/Mid Cool-Season Grasses</b>			63–314	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	0–314	–
	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	0–63	–
3	<b>Other Native Grasses</b>			157–314	
	foxtail barley	HOJU	<i>Hordeum jubatum</i>	63–251	–
	saltgrass	DISP	<i>Distichlis spicata</i>	31–157	–
	Graminoid (grass or grass-like)	2GRAM	<i>Graminoid (grass or grass-like)</i>	0–126	–
	fowl bluegrass	POPA2	<i>Poa palustris</i>	0–63	–
4	<b>Grass-likes</b>			314–785	
	sedge	CAREX	<i>Carex</i>	314–785	–
	spikerush	ELEOC	<i>Eleocharis</i>	0–157	–
	rush	JUNCU	<i>Juncus</i>	0–157	–
	Grass-like (not a true grass)	2GL	<i>Grass-like (not a true grass)</i>	0–157	–
5	<b>Non-Native Grasses</b>			785–1726	
	Kentucky bluegrass	POPR	<i>Poa pratensis</i>	785–1726	–
	smooth brome	BRIN2	<i>Bromus inermis</i>	0–785	–
<b>Forb</b>					
6	<b>Forbs</b>			157–314	
	goldenrod	SOLID	<i>Solidago</i>	31–157	–
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	31–157	–
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	31–157	–
	Forb, introduced	2FI	<i>Forb, introduced</i>	0–157	–
	Rocky Mountain iris	IRMI	<i>Iris missouriensis</i>	0–126	–
	Forb, native	2FN	<i>Forb, native</i>	0–94	–
	showy milkweed	ASSP	<i>Asclepias speciosa</i>	0–94	–
	white prairie aster	SYFA	<i>Symphotrichum falcatum</i>	0–63	–
	Missouri goldenrod	SOMI2	<i>Solidago missouriensis</i>	0–31	–
	prairie clover	DALEA	<i>Dalea</i>	0–31	–
	blazing star	LIATR	<i>Liatris</i>	0–31	–
<b>Shrub/Vine</b>					
7	<b>Shrubs</b>			31–157	
	western snowberry	SYOC	<i>Symphoricarpos occidentalis</i>	31–94	–
	Shrub (>.5m)	2SHRUB	<i>Shrub (&gt;.5m)</i>	0–63	–
	rose	ROSA5	<i>Rosa</i>	31–63	–
	willow	SALIX	<i>Salix</i>	0–63	–
	silver buffaloberry	SHAR	<i>Shepherdia argentea</i>	0–63	–

## **Animal community**

### Animal Community - Grazing Interpretations

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

#### Big Bluestem-Switchgrass-Indiangrass-Little Bluestem (1.1)

Total Annual Production (lb./ac. air-dry): 4800

Stocking Rate\* (AUM/acre): 1.32

#### Western Wheatgrass-Big Bluestem-Bluegrass/Sedge (1.2)

Total Annual Production (lb./ac. air-dry): 3800

Stocking Rate\* (AUM/acre): 1.04

#### Big Bluestem-Western Wheatgrass-Bluegrass/Sedge (1.3)

Total Annual Production (lb./ac. air-dry): 4000

Stocking Rate\* (AUM/acre): 1.10

#### Kentucky Bluegrass/Sedge (2.1)

Total Annual Production (lb./ac. air-dry): 2800

Stocking Rate\* (AUM/acre): 0.77

\* Based on 912 lbs./acre (air-dry weight) per Animal Unit Month (AUM), and on 25% harvest efficiency (refer to USDA NRCS, National Range and Pasture Handbook).

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 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, hiking, photography, bird watching and other opportunities. The wide variety of plants that bloom from spring until fall have an aesthetic value that appeals to visitors.

## **Wood products**

No appreciable wood products are typically present on this site.

## **Other products**

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

## **Other information**

Revision Notes: "Previously Approved Provisional

This Provisional ecological site concept has passed Quality Control (QC) and Quality Assurance (QA) to ensure that the site meets the 2014 NESH standards for a Provisional ecological site. This is an updated "Previously Approved" ESD which represents a first generation tier of documentation that prior to the release of the 2014 National Ecological Site Handbook (NESH), met all requirements as an Approved ESD as laid out in the 2003 National Range and Pasture Handbook (NRPH). The document fully describes the reference state and community phase in the state and transition model. All other alternative states are at least described in narrative form. The "Previously Approved" ESD has been field tested for a minimum of five years and is a proven functional document for conservation planning. The "Previously Approved" ESD does not contain all tabular and narrative entries as required in the current Approved level of documentation but it is expected that the "Previously Approved" ESD will continue refinement towards an Approved status.

Site Development and Testing Plan:

Future work, as described in a Project Plan, to validate the information in this Provisional Ecological Site Description is needed. This will include field activities to collect low, medium and high intensity sampling, soil correlations, and analysis of that data. Annual field reviews should be done by soil scientists and vegetation specialists. A final field review, peer review, quality control, and quality assurance reviews of the ESD will be needed to produce the final document.

## **Inventory data references**

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range-trained personnel were also used. Those involved in developing this site include: April Boltjes, Range Management Specialist, NRCS; Stan Boltz, Range Management Specialist, NRCS; Kent Cooley, Soil Scientist, NRCS; Rick Peterson, Range Management Specialist, NRCS; L. Michael Stirling, Range Management Specialist, NRCS. No SCS-RANGE-417 clipping data collection forms have been recorded for this site.

## **Other references**

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## **Contributors**

Stan Boltz

## **Acknowledgments**

Rick L. Peterson, ESD Update 6/28/16

## **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.

Author(s)/participant(s)	Stan Boltz
Contact for lead author	stanley.boltz@sd.usda.gov, 605-352-1236
Date	05/09/2010
Approved by	Stan Boltz
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

- 1. Number and extent of rills:** None.  

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- 2. Presence of water flow patterns:** None.  

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- 3. Number and height of erosional pedestals or terracettes:** None.  

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- 4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 0 to 5 percent is typical.  

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

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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):** Litter falls in place.  

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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 4 to 9 inches thick with black to very dark gray colors when moist. Structure typically is medium to fine granular 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:** Deep rooted species (mid and tall rhizomatous cool- and warm-season grasses and grass-likes) 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.
- 

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/mid warm-season grasses >>

Sub-dominant: Mid/tall cool-season grasses >

Other: Grass-likes = Forbs = Shrubs > Mid/short cool-season bunchgrasses

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.
- 

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

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Production ranges from 4,000-5,600 lbs./acre (air-dry weight). Reference value production is 4,800 lbs./acre (air-dry weight).
- 

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, Kentucky bluegrass – Russian olive can dominate this site in localized areas
- 

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