Ecological site R063AY020SD
Loamy Overflow

Accessed: 04/19/2024

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.

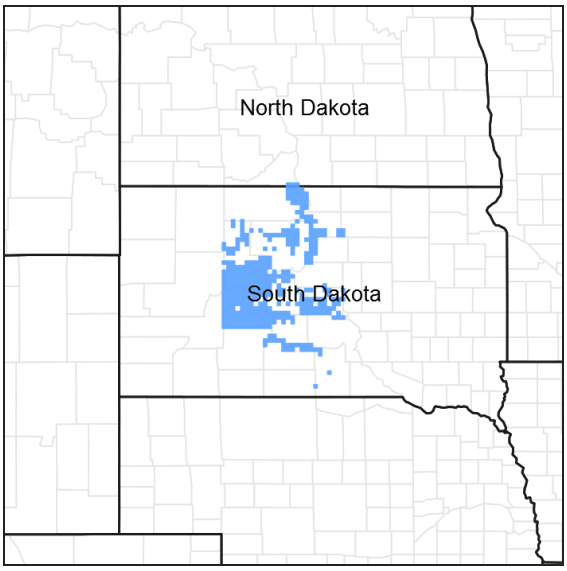

Figure 1. Mapped extent

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 Loamy Overflow Site occurs throughout the MLRA. It is located on Stream Orders 2 or greater. This site is a run-in site and receives additional moisture through runoff from adjacent sites and overflow during occasional flooding. Typical slopes range is from 0 to 5 percent. The soil surface layer is 4 to 12 inches in depth with a texture range of silt loam to silty clay loam. The natural vegetation will gradually shift from almost exclusively herbaceous species in the upper reaches of a drainage to a mix of species including; grasses, forbs, shrubs and trees, in the lower reaches. Vegetation in reference consists primarily of warm- and cool-season tall and mid grasses. Big bluestem and switchgrass are the dominate warm-season grasses, western wheatgrass and needlegrasses are the dominant cool-season grasses. Forbs are common and very diverse. Patches of western snowberry, American plum, chokecherry and willow are almost always present. Tree species can exist throughout the site but are more likely to occur in the lower reaches. Major tree species include: plains cottonwood, green ash, boxelder and hackberry. When disturbed this site is very susceptible to invasion of non-native cool-season grasses, Canada thistle, hound's tongue and other weedy forbs.

Associated sites

R063AY003SD	**Subirrigated**
R063AY010SD	**Loamy**
R063AY022SD	**Loamy Terrace**

Similar sites

R063AY010SD	**Loamy** Loamy [less big bluestem, more green needlegrass; lower production]
R063AY003SD	**Subirrigated** Subirrigated [more big bluestem and prairie cordgrass, less green needlegrass; higher production]

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Andropogon gerardii* (2) *Pascopyrum smithii*

Physiographic features

This site occurs on nearly level areas that receive additional water from overflow of streams or runoff from adjacent slopes.

Table 2. Representative physiographic features

Landforms	(1) Alluvial fan (2) Flood plain (3) Stream terrace
Flooding duration	Brief (2 to 7 days)
Flooding frequency	Occasional to frequent
Ponding frequency	None
Elevation	1,600–2,700 ft
Slope	0–5%

Water table depth	42–80 in
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)	19 in

Climate stations used

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

Influencing water features

The Loamy Overflow Site does receive periodic flooding.

Soil features

The soils in this site are moderately well to well drained and formed in alluvium. The silt loam to silty clay loam surface layer is 4 to 12 inches thick. The soils have a moderate to slow infiltration rate. This site should show no evidence of rills, wind scoured areas, or pedestalled plants. If present, water flow paths are broken, irregular in appearance, or discontinuous with numerous debris dams or vegetative barriers. The soil surface is stable and intact.
These soils are mainly susceptible to water erosion. The hazard of water erosion increases where vegetative cover is not adequate. A drastic loss of the soil surface layer on this site can result in a shift in species composition and/or production.
Soils correlated the Loamy Overflow Ecological Site include: Haverson, Lohmiller, Nimbo, Onita and Bigbend. Access Web Soil Survey (http://websoilsurvey.nrcs.usda.gov/app/) for specific local soils information.

Table 4. Representative soil features

Surface texture	(1) Silt loam (2) Silty clay loam (3) Silty clay
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Slow to moderate
Soil depth	80 in
Surface fragment cover <=3"	0–10%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	5–8 in
Calcium carbonate equivalent (0-40in)	0–20%
Electrical conductivity (0-40in)	0–4 mmhos/cm
Sodium adsorption ratio (0-40in)	0–10
Soil reaction (1:1 water) (0-40in)	6.6–9
Subsurface fragment volume <=3" (Depth not specified)	0–10%
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.

In the upper reaches of this site, continuous season-long grazing without adequate recovery periods following each grazing occurrence over several years causes this site to depart from the Reference State. Species such as western wheatgrass and blue grama will initially increase. Big bluestem, little bluestem, and green needlegrass will decrease in frequency and production. Heavy continuous grazing causes Kentucky bluegrass to increase and eventually develops into a sod condition. Extended periods of nonuse and no fire will result in a plant community having high litter levels, which favors an increase in Kentucky bluegrass, annual bromes and invasive forbs. Tree and shrub species, such as western snowberry, American plumb and choke cherry, occur naturally on this site but in minor amounts.

On the lower reaches of this site, trees and shrubs are very common and make up a substantial part of the plant communities. Flooding or no flooding, grazing or no grazing, fire and wildlife browse are the primary drivers of the system.

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

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 will be discussed in more detail in the plant community descriptions following the diagram.

State and transition model

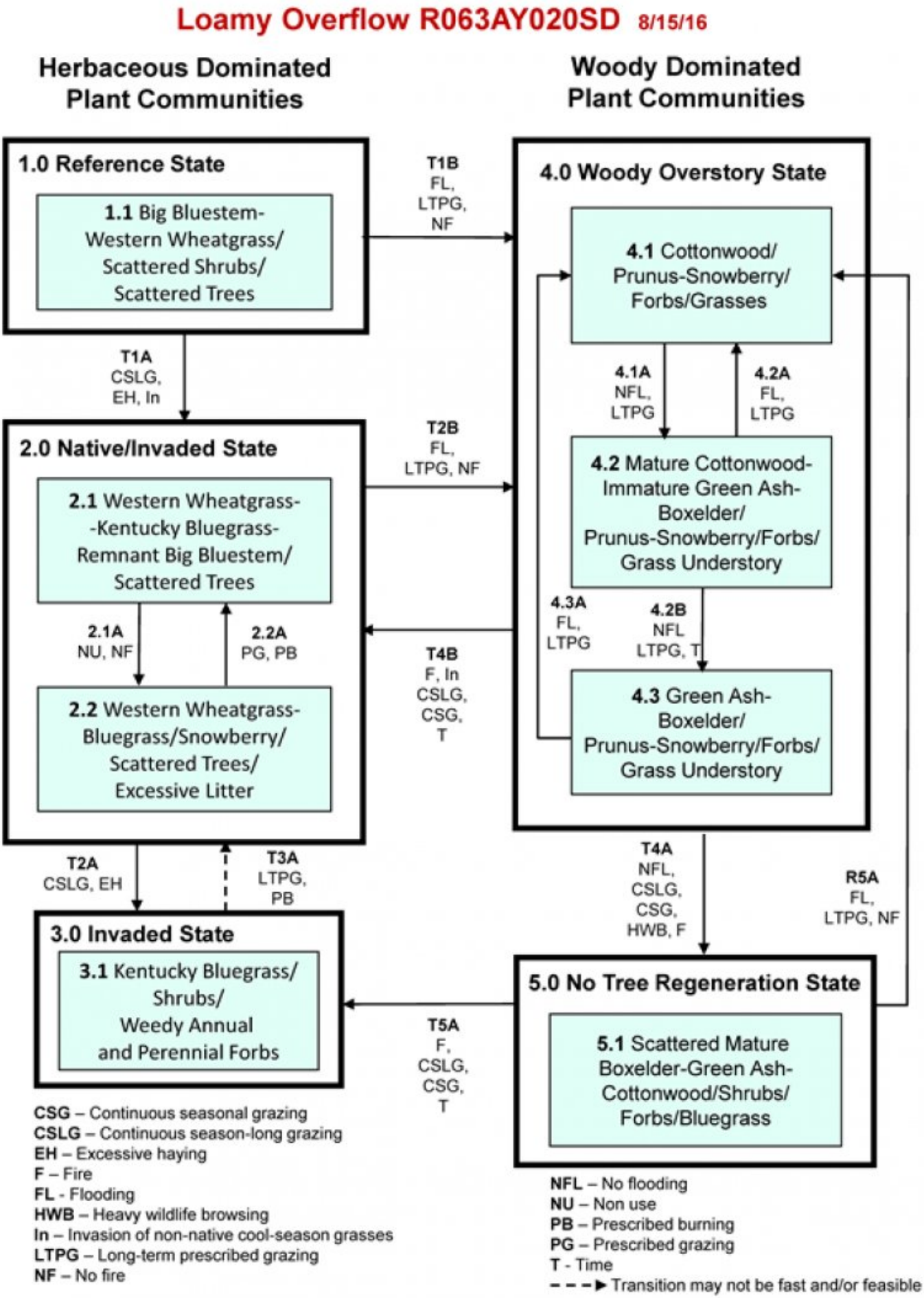

Figure 6. Loamy Overflow - R063AY020SD

Diagram Legend - Loamy Overflow - R063AY020SD	
T1A	Continuous season-long grazing or excessive haying, invasion and establishment of non-native, cool-season grasses.
T1B	Flooding followed by long-term prescribed grazing that included proper stocking, change in season of use and deferment which provides time for seedling establishment and no fire.
T2A	Continuous season-long grazing or excessive haying.
T2B	Flooding followed by long-term prescribed grazing that included proper stocking, change in season of use and deferment which provides time for seedling establishment and no fire.
T3A	Prescribed grazing with proper stocking rates, change is season of use and time for adequate recovery or possibly prescribed burning followed by long-term prescribed grazing. This transition may not be fast or feasible.
T4A	No flooding, continuous season-long grazing, continuous seasonal grazing, heavy wildlife browse, fire.
T4B	Fire, invasion of non-native, cool-season grasses, continuous season-long grazing, continuous seasonal grazing and time.
T5A	Fire, continuous season-long grazing or continuous seasonal grazing and time.
R5A	Flooding followed by long-term prescribed grazing that included proper stocking, change in season of use and deferment which provides time for seedling establishment and no fire.

CP 2.1A	2.1 - 2.2	No use and no fire
CP 2.2A	2.2 - 2.1	Prescribed grazing with proper stocking, change is season of use and adequate recovery, possibly prescribed burning followed by prescribed grazing.
CP 4.1A	4.1 - 4.2	No flooding, long-term prescribed grazing that included proper stocking, change in season of use and deferment which provides opportunity for woody regeneration and time.
CP 4.2A	4.2 - 4.1	Flooding, long-term prescribed grazing that included proper stocking, change in season of use and deferment which provides opportunity for woody regeneration.
CP 4.2B	4.2 - 4.3	No flooding, long-term prescribed grazing that included proper stocking, change in season of use and deferment which provides opportunity for woody regeneration and time.
CP 4.3A	4.3 - 4.1	Flooding, long-term prescribed grazing that included proper stocking, change in season of use and deferment which provides opportunity for woody regeneration.

Figure 7. Loamy Overflow - R063AY020SD

State 1
Reference State

This State represents what is believed to exist prior to European settlement. The Reference State may exist but is unlikely to function within the natural rage of variability due to the spread of Kentucky bluegrass and smooth brome in this MLRA. In Reference, this site is dominated by warm-and cool-season grasses, and various shrub and tree species that are scattered across the site. Grazing or the lack of grazing, flooding or lack of flooding, fire, excessive haying and invasion of non-native cool-season grasses are the major drivers of State. Flooding and no fire on this site can cause a transition to a Woody Overstory State.

Community 1.1
Big Bluestem-Western Wheatgrass/Scattered Shrubs/Scattered Trees Plant Community

This plant community is considered to be the reference plant community. This community of plants may be found on

areas that are properly managed with prescribed grazing that allows for adequate recovery periods following each grazing event. The potential vegetation is about 70 to 95 percent grasses and grass-like plants, 5 to 10 percent forbs, 2 to 8 percent shrubs, and 0 to 3 percent trees. Major grasses include big bluestem, wheatgrasses, little bluestem, green needlegrass, and switchgrass. Prairie sandreed may be prevalent on the more sandy textured sites. Other grasses occurring on this community include blue grama, Canada wildrye, needleandthread, sideoats, and prairie sandreed. Major forbs include cudweed sagewort, goldenrod, and scurfpea. Common shrubs include American plum, chokecherry, western snowberry, currents and willow. Green ash, bur oak, boxelder, American elm and plains cottonwood are scattered throughout the site. 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 properly. Plant litter is properly distributed with very little movement off-site and natural plant mortality is very low. The diversity in plant species allows for high drought tolerance. Runoff 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 (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	2385	2924	3375
Forb	150	255	400
Shrub/Vine	65	170	315
Tree	0	51	110
Total	**2600**	**3400**	**4200**

Figure 9. 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

State 2
Native/Invaded State

This State has a significant amount of Kentucky bluegrass or smooth brome in the plant community but they have not become the dominate species. In this State, Kentucky bluegrass makes up less than 30 percent of the plant community composition (by weight). This State is at risk of transitioning to a bluegrass dominated state (Invaded State 3.0).

Community 2.1
Western Wheatgrass-Kentucky Bluegrass-Remnant Big Bluestem/Scattered Tree Plant Community

This plant community results from continuous season-long grazing without adequate recovery periods between each grazing event during the growing season or excessive haying, and invasion of non-native cool-season grasses. Western wheatgrass is the dominant species, Kentucky bluegrass is subdominant. Big bluestem, little bluestem, green needlegrass, and switchgrass are greatly reduced. Significant forb species include American licorice, cudweed sagewort, goldenrod, heath aster, scurfpea, and western yarrow. Leadplant is greatly reduced while other shrub species would tend to be heavily browsed. Rose and western snowberry are the dominant shrub species. Scattered American elm, boxelder, bur oak, and green ash are common on this site. This plant community is relatively stable and less productive than the Big Bluestem-Western Wheatgrass/Scattered Shrub/Scattered Trees Plant Community (1.1). Reduction of litter and short plant heights result in higher soil temperatures, poor water, infiltration rates and increased runoff. This plant community can occur throughout the site, on spot grazed areas, and around water sources where season-long grazing patterns occur. Soil erosion will be minimal due to the sod forming habit of Kentucky bluegrass.

Table 6. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1570	2145	2465
Forb	115	221	360
Shrub/Vine	115	195	295
Tree	0	39	80
Total	**1800**	**2600**	**3200**

Figure 11. Plant community growth curve (percent production by month). SD6307, Pierre Shale Plains, cool-season dominant, warm-season subdominant.. Cool-season dominant, warm-season subdominant, lowland.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	13	20	25	18	11	5	3	0	0

Community 2.2
Western Wheatgrass-Bluegrass/Snowberry/Scattered Trees/Excessive Litter Plant Community

This plant community develops after an extended period of nonuse and exclusion of fire. This plant community will also develop with moderate or heavy continuous seasonal grazing. In either case, shrubs increase and can sometimes dominate the plant community. Cool-season grasses make up the majority of the understory with the balance made up of short warm-season grasses and miscellaneous forbs. Western wheatgrass and bluegrass are the dominant grasses. Grasses of secondary importance include big bluestem, little bluestem, Canada wildrye, green needlegrass, and needleandthread. Forbs commonly found in this plant community include American licorice, cudweed sagewort, goldenrod, and verbena. Woody plants such as American plum and western snowberry can be found on the site and can comprise up to 12 percent of the total canopy. This plant community is resistant to change without prescribed grazing and/or fire. The combination of both grazing and fire or other means to reduce shrub cover is most effective in moving this plant community toward the climax plant community. Soil erosion is low. Runoff is similar to the Reference Plant Community (1.1). Once the advanced stage of this plant community is reached, time and external resources will be needed to see recovery in the diversity of the site.

Table 7. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1590	1956	2265
Shrub/Vine	105	204	330
Forb	105	204	330
Tree	0	36	75
Total	**1800**	**2400**	**3000**

Figure 13. 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

Pathway 2.1A
Community 2.1 to 2.2

Nonuse and no fire will move this plant community to the Western Wheatgrass-Bluegrass/Snowberry/Scattered Trees/Excessive Litter Plant Community (2.2).

Pathway 2.2A

Community 2.2 to 2.1

Prescribed grazing that includes proper stocking, change in season of use and adequate time for recovery, and/or prescribed burning followed with prescribed grazing, can help transition plant community back to Plant Community Phase 2.1.

State 3
Invaded State

This state is the result of invasion and dominance of introduced species. This state is characterized by the dominance of Kentucky bluegrass and smooth brome, and an increasing thatch layer that effectively blocks introduction of other plants into the system. Plant litter accumulation tends to favor the more shade tolerant, introduced grass species. The nutrient cycle is also impaired, and the result is typically a higher level of nitrogen which also favors the introduced species. Increasing plant litter decreases the amount of sunlight reaching plant crowns thereby shifting competitive advantage to shade tolerant, introduced grass species. Studies indicate that soil biological activity is altered, and this shift apparently exploits the soil microclimate and encourages growth of the introduced grass species. Once the threshold is crossed, a change in grazing management alone cannot cause a reduction in the invasive grass dominance. Preliminary studies would tend to indicate this threshold may exist when Kentucky bluegrass exceeds 30 percent of the plant community and native grasses represent less than 40 percent 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).

Community 3.1
Kentucky Bluegrass/Shrubs/Weedy Annual and Perennial Forbs Plant Community

This plant community developed with continuous season-long grazing and or excessive haying. Kentucky bluegrass dominates the community and can develop into a “sodbound” appearance. Low vigor western wheatgrass can be found scattered throughout the community. Green needlegrass has been greatly reduced. Big bluestem may persist in minor amounts, greatly reduced in vigor and not readily seen. Western yarrow, scurfpea, ragweed, and common mullein have increased. Nonnative grasses and forbs such as annual bromes, curlycup gumweed, thistle, and cocklebur will invade this plant community. Western snowberry. American plum and chokecherry may persist in the plant community if not removed during haying activities. This plant community is resistant to change due to grazing tolerance of Kentucky bluegrass. A significant amount of production and diversity has been lost when compared to the Reference Plant Community (1.1). The dominance of non-native cool-season grasses and the loss of other desirable species has negatively impacted energy flow and nutrient cycling. Water infiltration is reduced significantly and soil loss may be accelerated where concentrated flows occur.

Table 8. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1070	1650	1965
Forb	95	200	345
Shrub/Vine	35	120	225
Tree	0	30	65
Total	**1200**	**2000**	**2600**

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

State 4
Woody Overstory State

This State is the result of the establishment of a tree over-story and shrub mid-story canopy. This State is more common on the lower reaches of the site. The dynamics of this State are largely due to flooding and successional changes starting with cottonwood and shrub establishment and eventually the development of a green ash and boxelder plant community. The successional process can restart following another flooding event. Water control structures which limit flooding, livestock grazing, heavy wildlife browse, fire and the introduction of non-native, cool-season grasses can alter the dynamics of this site resulting in old remnant stands of trees with little, if any regeneration.

Community 4.1
Cottonwood/Prunus-Snowberry/Forbs/Grasses Plant Community

This plant community typically occurs after a flooding event. Flooding reduces herbaceous competition through scouring of the soil surface, which provides a site for regeneration and establishment of cottonwood and shrubs. Prescribed grazing which prevents targeted grazing of cottonwood seedlings is necessary for this plant community to establish. Trees will range from seedlings to saplings, and the herbaceous understory will still be productive as a result of the filtered canopy of the deciduous trees. Understory shrubs, primarily plum and/or chokecherry, and snowberry will likely establish. However, other species, including silver buffaloberry, silver sagebrush and currants can occur and make up a significance percent of the shrub layer.

Community 4.2
Mature Cottonwood-Immature Green Ash-Boxelder/Prunus-Snowberry/Forbs/Grass Understory Plant Communit

Mature cottonwood trees and woody shrubs provide a suitable microclimate for establishment of other deciduous trees. Green ash and boxelder are typically the first trees to establish, but other species such as hackberry and possibly bur oak will established as well. The herbaceous plant community will remain relatively productive, but will be reduced somewhat from the Reference Plant Community (1.1). This is due mainly to the competition from the woody shrub understory.

Community 4.3
Green Ash-Boxelder/Prunus-Snowberry/Grass Understory Plant Community

This plant community develops over time, with prescribed grazing and no flooding. Cottonwood trees will likely remain in lesser numbers, but the dominant trees will normally be green ash, boxelder, and/or hackberry. At times there will be a mix of all three species. However, some areas will be dominated by one or two of these species. Woody shrubs will remain in the understory, but typically in lesser amounts than in the previous two plant communities. While somewhat reduced, the herbaceous understory will remain relatively productive. The trees will mostly be in the mature stage, but regeneration will normally be evident (i.e., seedlings and saplings should be present).

Pathway 4.1A
Community 4.1 to 4.2

No flooding and prescribed grazing that manages the herbaceous understory but is not detrimental to woody regeneration will cause this plant community to develop into the Mature Cottonwood-Immature Green Ash-Boxelder/Prunus-Snowberry/Forbs/Grass Understory Plant Community (4.2). Existing saplings must be large enough to avoid damage by livestock and wildlife for this pathway to occur.

Pathway 4.2A
Community 4.2 to 4.1

Flooding which opens up the herbaceous understory and allows for woody regeneration, followed by long-term prescribed grazing that manages for woody regeneration and establishment will shift this plant community back to the Cottonwood/Prunus-Snowberry/Forbs/Grasses Plant Community (4.1).

Pathway 4.2B

Community 4.2 to 4.3

No flooding, prescribed grazing that manages the herbaceous understory but is not detrimental to woody regeneration and time will transition this plant community to the Green Ash-Boxelder/Prunus-Snowberry/Forbs/Grass Understory (4.3).

Pathway 4.3A
Community 4.3 to 4.1

Flooding which opens up the herbaceous understory and allows for woody regeneration, followed by long-term prescribed grazing that manages for woody regeneration and establishment will shift this plant community back to the Cottonwood/Prunus-Snowberry/Forbs/Grasses Plant Community (4.1).

State 5
No Tree Regeneration State

This State developed as a result of no flooding, continuous season-long grazing or continuous seasonal grazing, or fire. With time, the cottonwood, boxelder and ash trees that survive become mature, and little or no regeneration occurs due mainly to grazing of seedlings and saplings. Wildlife browse can also contribute to the loss of tree and shrub regeneration. The type of grazing that limits regeneration also results in a reduction of the desirable native herbaceous species, often resulting in a dominance of species such as bluegrass and/or smooth brome, and forbs such as western ragweed, Canada thistle, burdock, and hound’s tongue.

Community 5.1
Scattered Mature Boxelder-Green Ash-Cottonwood-/Forbs/Bluegrass Plant Community

This plant community developed due to the lack of woody regeneration, natural occurrences of flooding events, and continuous season-long grazing without adequate recovery periods. Older mature trees, including cottonwood, boxelder and green ash remain. The trees are scattered, and the site may have a “park-like” appearance with few trees and reduced understory. If grazed during the winter, the increased durations of livestock loitering can result in manure accumulations and soil compaction which will reduce the vigor of the native understory plant community. Kentucky bluegrass, smooth brome continue to persist as dominant grass species at reduced production rates. The presence of non-desirable forb species such as Canada thistle, burdock and hound’s tongue can be prolific and difficult to control.

Transition 1A
State 1 to 2

Continuous season-long grazing and/or excessive haying and the invasion of non-native cool-season grasses will convert this plant community to the Native/Invaded State (2.0).

Transition 1B
State 1 to 4

Flooding, followed by long-term prescribed grazing, and no fire can transition this plant community to a woody dominated; Woody Overstory State (4.0). State 4.0 is more likely to occur on the mid to lower reaches of a drainage.

Transition 2A
State 2 to 3

Continuous season-long grazing and/or excessive haying will result in a transition to the Invaded State.

Transition 2B
State 2 to 4

Flooding followed by long-term prescribed grazing, including proper stocking, change in season of use and

adequate time for recovery will likely transition this site to the Woody Overstory State. Timed grazing is very important and must be followed for many years in order for saplings to attain a height where livestock will not damage and/or kill the trees. Wildlife browse can also be a concern if the management objective are to improve the over-story canopy. The Woody Overstory State (4.0) is more likely to occur on the mid to lower reaches of a drainage.

Transition 3A
State 3 to 1

Prescribed grazing and/or prescribed burning may transition the plant community to the Native/Invaded State (3.0). This is assuming an adequate seed/vegetative source is available. This transition my take an extended period of time and in the end my not meet management objectives.

Transition 4B
State 4 to 3

Fire, invasion of non-native, cool-season grasses, continuous season-long grazing or continuous seasonal grazing resulting in little woody regeneration and time, will transition this state to the Native/Invaded State (3.0).

Transition 4A
State 4 to 5

No flooding, continuous season-long grazing, continuous seasonal grazing, heavy wildlife browse or fire can cause any of the plant communities in the Woody Overstory State (4.0) to transition to the No Regeneration State (5.0).

Transition 5A
State 5 to 3

Fire, continuous season-long grazing, continuous seasonal grazing and invasion of non-native cool-season grasses will transition this plant community to the Invaded State (3.0).

Restoration pathway 5A
State 5 to 4

Flooding followed by long-term prescribed grazing which manages for woody regeneration and establishment and no fire can transition this State to the Cottonwood/Prunus-Snowberry/Forbs/Grasses Plant Community (4.1).

Additional community tables

Table 9. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Tall Warm-Season Grasses**			680–1530	
	big bluestem	ANGE	*Andropogon gerardii*	680–1360	–
	switchgrass	PAVI2	*Panicum virgatum*	68–340	–
	prairie sandreed	CALO	*Calamovilfa longifolia*	0–170	–
	marsh muhly	MURA	*Muhlenbergia racemosa*	0–102	–
2	**Wheatgrasses**			340–850	
	western wheatgrass	PASM	*Pascopyrum smithii*	340–680	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	34–340	–
3	**Cool-Season Bunchgrasses**			170–510	
	green needlegrass	NAVI4	*Nassella viridula*	170–510	–
	Nuttall's alkaligrass	PUNU2	*Puccinellia nuttalliana*	0–170	–

	Nuttall's alkaligrass	PUNU2	*Puccinellia nuttalliana*	0–170	
	Canada wildrye	ELCA4	*Elymus canadensis*	0–170	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	0–170	–
	porcupinegrass	HESP11	*Hesperostipa spartea*	0–170	–
4	**Mid Warm-Season Grasses**			68–340	
	little bluestem	SCSC	*Schizachyrium scoparium*	68–340	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	34–170	–
	composite dropseed	SPCOC2	*Sporobolus compositus var. compositus*	34–102	–
5	**Short Warm-Season Grasses**			34–170	
	blue grama	BOGR2	*Bouteloua gracilis*	34–170	–
	buffalograss	BODA2	*Bouteloua dactyloides*	0–102	–
6	**Other Native Grasses**			34–238	
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	0–170	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	34–102	–
	scratchgrass	MUAS	*Muhlenbergia asperifolia*	0–68	–
7	**Grass-likes**			34–170	
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	0–170	–
	needleleaf sedge	CADU6	*Carex duriuscula*	34–170	–
Forb					
9	**Forbs**			170–340	
	Forb, native	2FN	*Forb, native*	34–170	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	34–102	–
	scurfpea	PSORA2	*Psoralidium*	34–102	–
	goldenrod	SOLID	*Solidago*	34–102	–
	white heath aster	SYER	*Symphyotrichum ericoides*	34–68	–
	vervain	VERBE	*Verbena*	34–68	–
	American vetch	VIAM	*Vicia americana*	34–68	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	34–68	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	34–68	–
	Maximilian sunflower	HEMA2	*Helianthus maximiliani*	0–68	–
	aster	ASTER	*Aster*	0–68	–
	false boneset	BREU	*Brickellia eupatorioides*	0–68	–
	wavyleaf thistle	CIUN	*Cirsium undulatum*	0–68	–
	purple prairie clover	DAPU5	*Dalea purpurea*	0–68	–
	western yarrow	ACMIO	*Achillea millefolium var. occidentalis*	34–68	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	34–68	–
	great ragweed	AMTR	*Ambrosia trifida*	0–68	–
	northern bedstraw	GABO2	*Galium boreale*	0–34	–
	scarlet beeblossom	GACO5	*Gaura coccinea*	0–34	–
	starry false lily of the valley	MAST4	*Maianthemum stellatum*	0–34	–
	meadow zizia	ZIAP	*Zizia aptera*	0–34	–
	nettle	URTIC	*Urtica*	0–34	–
Shrub/Vine					

10	**Shrubs**			68–272	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	34–170	–
	western snowberry	SYOC	*Symphoricarpos occidentalis*	34–170	–
	leadplant	AMCA6	*Amorpha canescens*	34–102	–
	American plum	PRAM	*Prunus americana*	34–102	–
	chokecherry	PRVI	*Prunus virginiana*	0–102	–
	golden currant	RIAU	*Ribes aureum*	0–68	–
	rose	ROSA5	*Rosa*	34–68	–
	silver buffaloberry	SHAR	*Shepherdia argentea*	0–68	–
Tree					
11	**Trees**			0–102	
	Tree	2TREE	*Tree*	0–102	–
	boxelder	ACNE2	*Acer negundo*	0–102	–
	green ash	FRPE	*Fraxinus pennsylvanica*	0–102	–
	bur oak	QUMA2	*Quercus macrocarpa*	0–102	–
	American elm	ULAM	*Ulmus americana*	0–102	–

Table 10. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Tall Warm-Season Grasses**			130–390	
	big bluestem	ANGE	*Andropogon gerardii*	130–390	–
	switchgrass	PAVI2	*Panicum virgatum*	0–130	–
2	**Wheatgrasses**			520–910	
	western wheatgrass	PASM	*Pascopyrum smithii*	390–780	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	52–390	–
3	**Cool-Season Bunchgrasses**			130–390	
	green needlegrass	NAVI4	*Nassella viridula*	52–312	–
	Nuttall's alkaligrass	PUNU2	*Puccinellia nuttalliana*	26–208	–
	Canada wildrye	ELCA4	*Elymus canadensis*	0–130	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	0–130	–
	porcupinegrass	HESP11	*Hesperostipa spartea*	0–78	–
4	**Mid Warm-Season Grasses**			26–130	
	little bluestem	SCSC	*Schizachyrium scoparium*	26–130	–
	composite dropseed	SPCOC2	*Sporobolus compositus var. compositus*	0–78	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	0–78	–
5	**Short Warm-Season Grasses**			52–208	
	blue grama	BOGR2	*Bouteloua gracilis*	52–208	–
	buffalograss	BODA2	*Bouteloua dactyloides*	0–130	–
6	**Other Native Grasses**			26–182	
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	26–182	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–78	–

	scratchgrass	MUAS	*Muhlenbergia asperifolia*	0–78	–
7	**Grass-likes**			26–130	
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	0–130	–
	needleleaf sedge	CADU6	*Carex duriuscula*	26–130	–
8	**Non-Native Grasses**			130–390	
	bluegrass	POA	*Poa*	130–390	–
	smooth brome	BRIN2	*Bromus inermis*	0–130	–
	cheatgrass	BRTE	*Bromus tectorum*	0–130	–
Forb					
9	**Forbs**			130–312	
	Forb, introduced	2FI	*Forb, introduced*	0–130	–
	Forb, native	2FN	*Forb, native*	26–130	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	26–104	–
	goldenrod	SOLID	*Solidago*	26–104	–
	white heath aster	SYER	*Symphyotrichum ericoides*	26–78	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	26–78	–
	scurfpea	PSORA2	*Psoralidium*	26–78	–
	western yarrow	ACMIO	*Achillea millefolium var. occidentalis*	26–78	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	26–78	–
	great ragweed	AMTR	*Ambrosia trifida*	0–78	–
	vervain	VERBE	*Verbena*	26–78	–
	common mullein	VETH	*Verbascum thapsus*	0–78	–
	burdock	ARCTI	*Arctium*	0–52	–
	aster	ASTER	*Aster*	0–52	–
	wavyleaf thistle	CIUN	*Cirsium undulatum*	0–52	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	26–52	–
	yellow salsify	TRDU	*Tragopogon dubius*	0–52	–
	nettle	URTIC	*Urtica*	0–52	–
	curly dock	RUCR	*Rumex crispus*	0–26	–
	purple prairie clover	DAPU5	*Dalea purpurea*	0–26	–
	American vetch	VIAM	*Vicia americana*	0–26	–
Shrub/Vine					
10	**Shrubs**			130–260	
	western snowberry	SYOC	*Symphoricarpos occidentalis*	52–182	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–130	–
	rose	ROSA5	*Rosa*	26–78	–
	American plum	PRAM	*Prunus americana*	0–52	–
	chokecherry	PRVI	*Prunus virginiana*	0–26	–
	leadplant	AMCA6	*Amorpha canescens*	0–26	–
	silver buffaloberry	SHAR	*Shepherdia argentea*	0–26	–
Tree					
11	**Trees**			0–78	
	Tree	2TREE	*Tree*	0–78	–
	boxelder	ACNE2	*Acer negundo*	0–78	–

	green ash	FRPE	*Fraxinus pennsylvanica*	0–78	–
	bur oak	QUMA2	*Quercus macrocarpa*	0–78	–
	American elm	ULAM	*Ulmus americana*	0–78	–

Table 11. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Tall Warm-Season Grasses**			48–240	
	big bluestem	ANGE	*Andropogon gerardii*	48–240	–
	switchgrass	PAVI2	*Panicum virgatum*	0–72	–
	marsh muhly	MURA	*Muhlenbergia racemosa*	0–48	–
2	**Wheatgrasses**			360–720	
	western wheatgrass	PASM	*Pascopyrum smithii*	360–720	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	0–240	–
3	**Cool-Season Bunchgrasses**			120–360	
	green needlegrass	NAVI4	*Nassella viridula*	120–360	–
	Canada wildrye	ELCA4	*Elymus canadensis*	0–192	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	0–120	–
	porcupinegrass	HESP11	*Hesperostipa spartea*	0–120	–
	Nuttall's alkaligrass	PUNU2	*Puccinellia nuttalliana*	0–120	–
4	**Mid Warm-Season Grasses**			0–120	
	little bluestem	SCSC	*Schizachyrium scoparium*	0–120	–
	composite dropseed	SPCOC2	*Sporobolus compositus var. compositus*	0–72	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	0–72	–
5	**Short Warm-Season Grasses**			0–72	
	blue grama	BOGR2	*Bouteloua gracilis*	0–72	–
	buffalograss	BODA2	*Bouteloua dactyloides*	0–24	–
6	**Other Native Grasses**			0–120	
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	0–120	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–48	–
	scratchgrass	MUAS	*Muhlenbergia asperifolia*	0–24	–
7	**Grass-likes**			24–120	
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	0–120	–
	needleleaf sedge	CADU6	*Carex duriuscula*	24–120	–
8	**Non-Native Grasses**			360–720	
	bluegrass	POA	*Poa*	240–600	–
	smooth brome	BRIN2	*Bromus inermis*	0–240	–
	cheatgrass	BRTE	*Bromus tectorum*	24–240	–
Forb					
9	**Forbs**			120–288	
	Forb, introduced	2FI	*Forb, introduced*	0–120	–
	Forb, native	2FN	*Forb, native*	24–120	–

	white sagebrush	ARLU	*Artemisia ludoviciana*	24–120	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	24–96	–
	goldenrod	SOLID	*Solidago*	24–72	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	24–72	–
	great ragweed	AMTR	*Ambrosia trifida*	0–72	–
	yellow salsify	TRDU	*Tragopogon dubius*	0–72	–
	vervain	VERBE	*Verbena*	24–72	–
	common mullein	VETH	*Verbascum thapsus*	0–72	–
	nettle	URTIC	*Urtica*	0–48	–
	burdock	ARCTI	*Arctium*	0–48	–
	western yarrow	ACMIO	*Achillea millefolium var. occidentalis*	24–48	–
	wavyleaf thistle	CIUN	*Cirsium undulatum*	0–48	–
	white heath aster	SYER	*Symphyotrichum ericoides*	24–48	–
	scurfpea	PSORA2	*Psoralidium*	24–48	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	24–48	–
	aster	ASTER	*Aster*	0–48	–
	false boneset	BREU	*Brickellia eupatorioides*	0–24	–
	Maximilian sunflower	HEMA2	*Helianthus maximiliani*	0–24	–
	starry false lily of the valley	MAST4	*Maianthemum stellatum*	0–24	–
	curly dock	RUCR	*Rumex crispus*	0–24	–
	purple prairie clover	DAPU5	*Dalea purpurea*	0–24	–
	northern bedstraw	GABO2	*Galium boreale*	0–24	–
	scarlet beeblossom	GACO5	*Gaura coccinea*	0–24	–
	American vetch	VIAM	*Vicia americana*	0–24	–
Shrub/Vine					
10	**Shrubs**			120–288	
	western snowberry	SYOC	*Symphoricarpos occidentalis*	48–240	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–120	–
	American plum	PRAM	*Prunus americana*	0–72	–
	leadplant	AMCA6	*Amorpha canescens*	0–48	–
	rose	ROSA5	*Rosa*	24–48	–
	silver buffaloberry	SHAR	*Shepherdia argentea*	0–48	–
	chokecherry	PRVI	*Prunus virginiana*	0–24	–
	golden currant	RIAU	*Ribes aureum*	0–24	–
Tree					
11	**Trees**			0–72	
	Tree	2TREE	*Tree*	0–72	–
	boxelder	ACNE2	*Acer negundo*	0–72	–
	green ash	FRPE	*Fraxinus pennsylvanica*	0–72	–
	bur oak	QUMA2	*Quercus macrocarpa*	0–72	–
	American elm	ULAM	*Ulmus americana*	0–72	–

Table 12. Community 3.1 plant community composition

				Annual Production	Foliar Cover

Group	Common Name	Symbol	Scientific Name	(Lb/Acre)	(%)
Grass/Grasslike					
1	**Tall Warm-Season Grasses**			0–60	
	big bluestem	ANGE	*Andropogon gerardii*	0–60	–
2	**Wheatgrasses**			0–300	
	western wheatgrass	PASM	*Pascopyrum smithii*	0–300	–
3	**Cool-Season Bunchgrasses**			0–80	
	green needlegrass	NAVI4	*Nassella viridula*	0–60	–
	Nuttall's alkaligrass	PUNU2	*Puccinellia nuttalliana*	0–40	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	0–40	–
5	**Short Warm-Season Grasses**			40–200	
	blue grama	BOGR2	*Bouteloua gracilis*	40–200	–
	buffalograss	BODA2	*Bouteloua dactyloides*	0–100	–
6	**Other Native Grasses**			0–100	
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	0–100	–
	scratchgrass	MUAS	*Muhlenbergia asperifolia*	0–60	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–20	–
7	**Grass-likes**			20–60	
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	0–60	–
	needleleaf sedge	CADU6	*Carex duriuscula*	20–60	–
8	**Non-Native Grasses**			500–1200	
	bluegrass	POA	*Poa*	400–900	–
	smooth brome	BRIN2	*Bromus inermis*	0–300	–
	cheatgrass	BRTE	*Bromus tectorum*	40–300	–
Forb					
9	**Forbs**			100–300	
	Forb, introduced	2FI	*Forb, introduced*	0–140	–
	common mullein	VETH	*Verbascum thapsus*	20–120	–
	Forb, native	2FN	*Forb, native*	20–100	–
	western yarrow	ACMIO	*Achillea millefolium var. occidentalis*	20–100	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	20–100	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	20–80	–
	vervain	VERBE	*Verbena*	20–80	–
	white heath aster	SYER	*Symphyotrichum ericoides*	20–80	–
	yellow salsify	TRDU	*Tragopogon dubius*	20–60	–
	nettle	URTIC	*Urtica*	0–60	–
	scurfpea	PSORA2	*Psoralidium*	0–60	–
	goldenrod	SOLID	*Solidago*	20–60	–
	burdock	ARCTI	*Arctium*	0–60	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	0–40	–
	great ragweed	AMTR	*Ambrosia trifida*	0–40	–
	curly dock	RUCR	*Rumex crispus*	0–40	–

	upright prairie coneflower	RACO3	*Ratibida columnifera*	0–20	–
	aster	ASTER	*Aster*	0–20	–
	wavyleaf thistle	CIUN	*Cirsium undulatum*	0–20	–
Shrub/Vine					
10	**Shrubs**			40–200	
	western snowberry	SYOC	*Symphoricarpos occidentalis*	20–160	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–60	–
	rose	ROSA5	*Rosa*	20–40	–
	American plum	PRAM	*Prunus americana*	0–20	–
Tree					
11	**Trees**			0–60	
	Tree	2TREE	*Tree*	0–60	–
	boxelder	ACNE2	*Acer negundo*	0–60	–
	green ash	FRPE	*Fraxinus pennsylvanica*	0–60	–
	bur oak	QUMA2	*Quercus macrocarpa*	0–60	–
	American elm	ULAM	*Ulmus americana*	0–60	–

Animal community

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/Western Wheatgrass/Scattered Shrubs and Trees Plant Community (1.1)
Average Annual Production lbs/acre air-dry: 3400
Stocking rate* (AUM/acre): 0.87

Western Wheatgrass-Kentucky Bluegrass-Remnant Big Bluestem/Scattered Trees Plant Community (2.1)
Average Annual Production lbs./acre air dry: 2600
Stocking rate* (AUM/acre): 0.65

Western Wheatgrass-Bluegrass/Snowberry/Scattered Trees/Excessive Litter Plant Community (2.2)
Average Annual Production lbs./acre air-dry: 2400
Stocking rate* (AUM/acre): 0.60

Kentucky Bluegrass/Weedy Annual and Perennial Forbs Plant Community (3.1)
Average Annual Production lbs./acre air dry: 2000
Stocking rate* (AUM/acre): 0.35

Other Plant Community Phases have highly variable forage production levels. Actual on-site forage inventories will need to be conducted to determine average annual production, stocking rates and timing of grazing.

*Based on 912 lbs./acre (air-dry weight) per Animal Unit Month (AUM), and on 25 percent harvest efficiency of preferred and desirable forage species (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 groups B and C. Infiltration and runoff potential for this site varies from moderate to high depending on soil hydrologic group, slope and ground cover. In many cases, areas with greater than 75 percent ground cover have the greatest potential for high infiltration and lower runoff. An exception would be where shortgrasses form a dense sod and dominate the site. Normally areas where ground cover is less than 50 percent have the greatest potential to have reduced infiltration and higher runoff (refer to Section 4, NRCS National Engineering Handbook for runoff quantities and hydrologic curves).

Recreational uses

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

Wood products

Downed hardwood on this site are often utilized for firewood.

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 requirement as an Approved ESD as laid out in the 2003 National Range and Pasture Handbook (NRPH). The document fully describe 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 (RMS), NRCS; Stan Boltz, RMS, NRCS; Kent Cooley, Soil Scientist, NRCS; Rick Peterson, RMS, NRCS; and L. Michael Stirling, RMS, NRCS. No SCS-RANGE-417 clipping data forms have been collected and recorded on this site.

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Contributors

Betty Bisch
Stan Boltz
Rick Peterson

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Rick L. Peterson updated ESD - 8/16/16

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	05/08/2010
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:** Typically none or barely visible. Evidence of water flow may be present after high overland flow events or flooding from adjacent streams, but vegetation normally remains intact.

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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 typical, however limited headcutting may form after high runoff or flooding events. Existing gullies should be stabilized with good vegetative cover.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** None typical, but limited deposition may occur after major runoff or flooding events.

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7. **Amount of litter movement (describe size and distance expected to travel):** Litter of small and medium size classes will move after average to high rainfall events. Litter does not travel far, typically being trapped in small bunches by the extensive vegetative cover. Litter movement may be fairly extensive after major runoff or flooding events.

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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 12 inches thick with mollic (dark) 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:** Combination of shallow and deep rooted species (mid & tall rhizomatous and tufted perennial cool- and warm-season grasses) with fine and coarse roots positively influences infiltration

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None – when dry, B horizons can be hard and appear to be compacted, but no platy structure will be present.

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

    Dominant: Tall warm-season rhizomatous >> Mid cool-season rhizomatous grasses >

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

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

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or**

decadence): Very little evidence of decadence or mortality. Bunch grasses have strong, healthy centers and shrubs are vigorous.

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

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Production ranges from 2,600-4,200 lbs./acre (air-dry weight). Reference value production is 3,400 lbs./acre (air-dry weight).

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** State and local noxious weeds, Kentucky bluegrass, snowberry, smooth bromegrass

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