USDA Natural Resources Conservation Service

Ecological site R060AY036SD
Saline Subirrigated

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Accessed: 05/12/2025

General information

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

MLRA notes

Major Land Resource Area (MLRA): 060A–Pierre Shale Plains

The Pierre Shale Plains (MLRA 60A) consists of approximately 10,150 square miles, the majority of which is located in South Dakota (70 percent) and small portions are in Montana (2 percent), Nebraska (8 percent), and Wyoming (20 percent). It encircles the Black Hills (MLRA 62) and the Dakota Hogback (MLRA 61). MLRA 60A includes portions of the Oglala, Buffalo Gap, and Thunder Basin National Grasslands. It also includes small sections of the Pine Ridge Indian Reservation, Badlands National Park, and Black Hills National Forest. The Cheyenne and Belle Fourche Rivers flow through the MLRA.

MLRA 60A is in the unglaciated section of the Missouri Plateau, of the Great Plains Province of the Interior Plains. It is an area of old plateaus and terraces that have been deeply eroded. Cretaceous Pierre Shale underlies almost all of this MLRA. This is a marine sediment with layers of volcanic ash that has been altered to smectitic clay. These clays shrink as they dry and swell as they receive moisture. Soils are shallow to very deep and generally are well drained and clayey.

Elevations generally range from 2,620 to 3,610 feet throughout the MLRA, but can range up to 4,260 feet. The average annual precipitation for the western side of the MLRA is 13 to 16 inches, whereas the eastern side receives 16 to 18 inches. A suite of ecological sites have been written specifically for these two precipitation zones. The Locator Map shows the break between the two precipitation zones.

This area supports a mixed natural prairie vegetation consisting of both cool- and warm-season grasses and forbs. Wyoming big sagebrush occurs primarily in the drier western portion of the MLRA, however, small remnant stands can be found in the eastern portion. Dominant land uses of the area are primarily ranching and, to a lesser extent, farming. Major resource concerns to this MLRA are wind erosion and surface water quality.

Classification relationships

USDA - Land Resource Region G – Western Great Plains Range and Irrigated Region, Major Land Resource Area (MLRA) 60A – Pierre Shale Plains.

EPA - Level IV Ecoregions of the Continental United States: 43e – Sagebrush Steppe, 43g Semiarid Pierre Shale Plains, and 43k – Dense Clay Prairie.

Ecological site concept

The Saline Subirrigated ecological site occurs primarily in the western portion of MLRA 60A. It is a run-in site located on floodplains and low stream terraces. Slopes range from 0 to 3 percent. The soils are formed in loamy or sandy alluvium, are poor to moderately well drained, and have a permanent water table that fluctuates between 2 and 5 feet below the surface. The water table is strongly saline and/or alkaline. Soils typically have visible salts within 6 inches of the surface. Vegetation in the Reference Plant Community (1.0) consists of warm- and cool-

season grasses, sedges, forbs, and a few shrubs.

Associated sites

R060AY007SD	**Saline Lowland** The Saline Lowland site can be found adjacent to this site, but will not have a permanent water table. Vegetation may be similar.
R060AY002SD	**Wet Land** The Wet Land site can be found adjacent to this site, but the surface water will be present at least during a portion of the year.

Similar sites

R060AY003SD	**Subirrigated** Subirrigated site will not be as effected by salts. There will be more big bluestem and Indiangrass and higher production.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Sporobolus airoides* (2) *Distichlis spicata*

Physiographic features

This site is nearly level to gently sloping and occurs on river valleys.

Table 2. Representative physiographic features

Landforms	(1) Alluvial fan (2) Flood plain (3) Stream terrace
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Rare to occasional
Ponding frequency	None
Elevation	2,500–4,300 ft
Slope	0–3%
Water table depth	12–48 in
Aspect	Aspect is not a significant factor

Climatic features

The climate in this MLRA is typical of the drier portions of the Northern Great Plains, where sagebrush steppes to the west yield to grassland steppes to the east. Annual precipitation for the entire MLRA ranges from 13 to 18 inches per year, with most occurring during the growing season. Temperatures show a wide range between summer and winter and between daily maximums and minimums, due to the high elevation and dry air, which permits rapid incoming and outgoing radiation. Cold air masses from Canada in winter move rapidly from northwest to southeast and account for extreme minimum temperatures. Chinook winds may occur in winter and bring rapid rises in temperature. Extreme storms may occur during the winter, but the more severe occur during late fall, late winter, and spring. The normal average annual temperature is about 46°F. January is the coldest month with average temperatures ranging from about 19°F (Moorcroft CAA, WY) to about 22°F (Belle Fourche, SD). July is the warmest month with temperatures averaging from about 70°F (Moorcroft CAA, WY) to about 72°F (Belle Fourche, SD). The range of normal average monthly temperatures between the coldest and warmest months is about 51°F. 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 generally are 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 can 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 (characteristic range)	98-105 days
Freeze-free period (characteristic range)	123-129 days
Precipitation total (characteristic range)	15-18 in
Frost-free period (actual range)	76-108 days
Freeze-free period (actual range)	113-133 days
Precipitation total (actual range)	14-18 in
Frost-free period (average)	97 days
Freeze-free period (average)	124 days
Precipitation total (average)	16 in

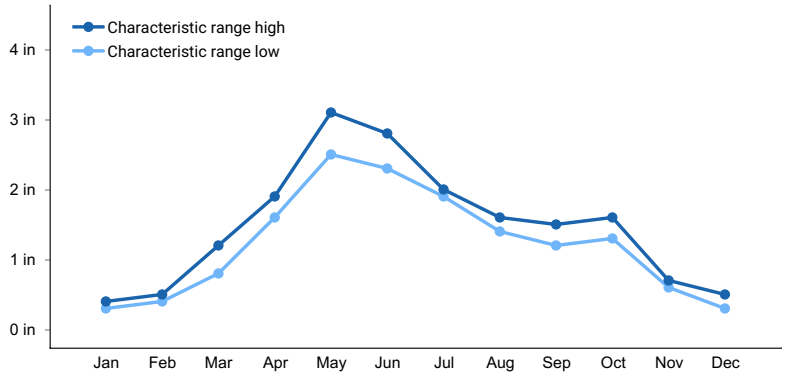

Figure 1. Monthly precipitation range

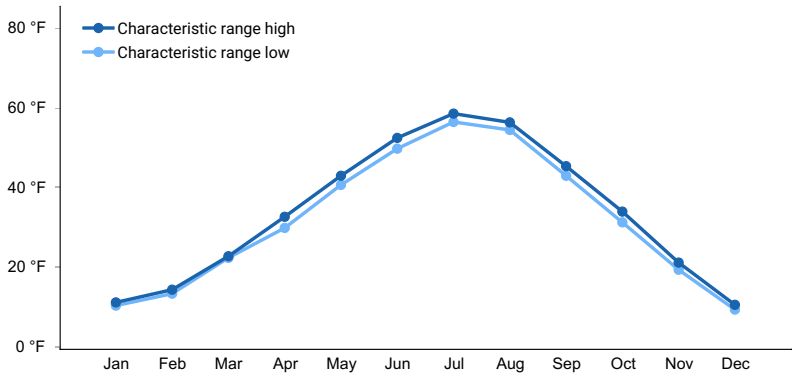

Figure 2. Monthly minimum temperature range

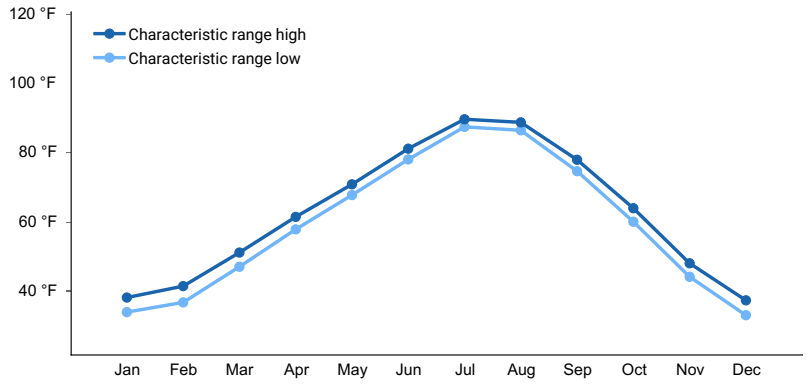

Figure 3. Monthly maximum temperature range

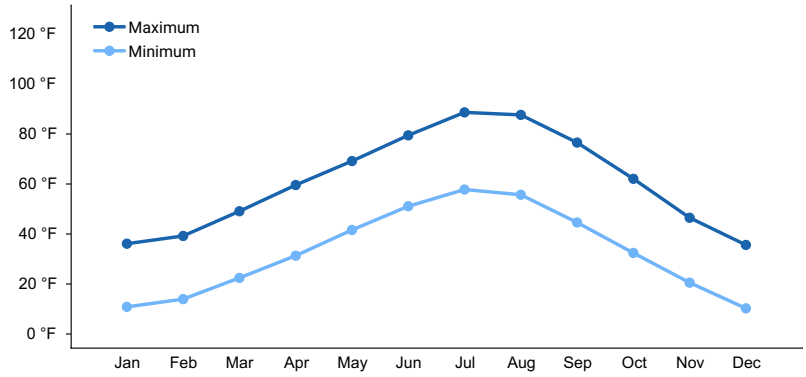

Figure 4. Monthly average minimum and maximum temperature

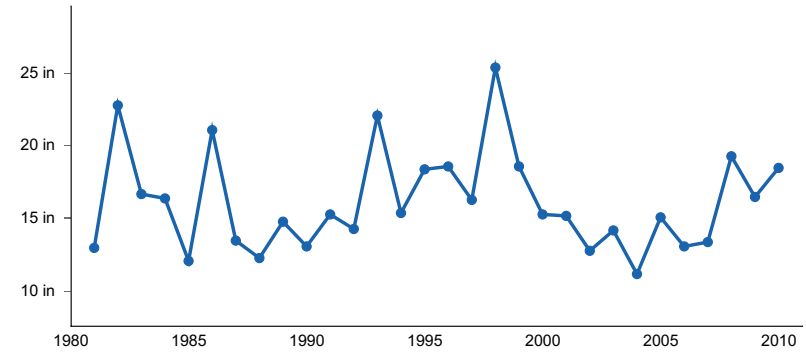

Figure 5. Annual precipitation pattern

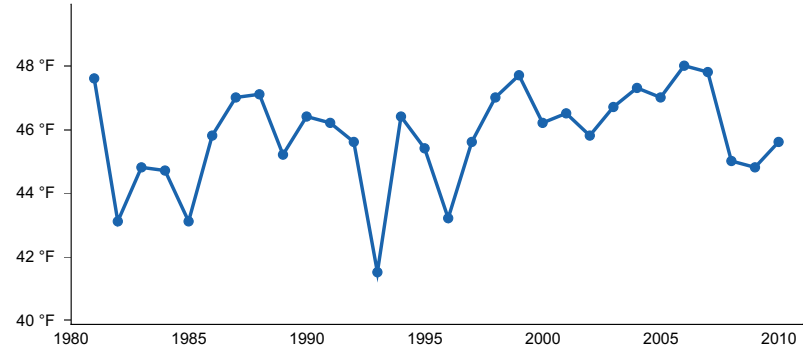

Figure 6. Annual average temperature pattern

Climate stations used

- (1) UPTON [USC00489205], Upton, WY
- (2) WASTA [USC00398911], Owanka, SD
- (3) REDBIRD [USC00487555], Lance Creek, WY

- (4) MOORCROFT 3S [USW00024088], Moorcroft, WY
- (5) ARDMORE 1 NW [USC00390236], Edgemont, SD
- (6) BELLE FOURCHE [USC00390559], Belle Fourche, SD

Influencing water features

The Saline Subirrigated site has a permanent water table between 2 and 5 feet below the surface.

Soil features

The soils in this site are somewhat poorly drained and formed in loamy or sandy alluvium. The surface layer is 1 to 12 inches thick. The texture of the subsurface ranges from very fine sandy loam to clay loam. Layers with finer textures may occur in the lower parts of some profiles. Soils will typically have visible salt crystals within 6 inches of the surface. The water table is found within 1 to 2 feet of the surface and is strongly saline and/or alkaline. Salt crusts are commonly found on ridges and mounds during the dry periods. This site should show no evidence of rills, wind-scoured areas or pedestalled plants. Water flow paths are broken, irregular in appearance, or discontinuous with numerous debris dams or vegetative barriers. The soil surface is stable and intact.

No soils are currently correlated to the Saline Subirrigated site in MLRA 60A.

More information can be found in the various soil survey reports. Contact the local USDA Service Center for soil survey reports that include more detail specific to your location.

Table 4. Representative soil features

Surface texture	(1) Clay loam (2) Loam (3) Very fine sandy loam
Family particle size	(1) Loamy
Drainage class	Poorly drained to somewhat poorly drained
Permeability class	Moderately slow to moderately rapid
Soil depth	80 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	5–7 in
Calcium carbonate equivalent (0-40in)	0–10%
Electrical conductivity (0-40in)	2–16 mmhos/cm
Sodium adsorption ratio (0-40in)	0–13
Soil reaction (1:1 water) (0-40in)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–10%
Subsurface fragment volume >3" (Depth not specified)	0–5%

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 specify 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, species such as inland saltgrass and foxtail barley increase. Grasses such as alkali sacaton, alkali cordgrass, western wheatgrass, and slender wheatgrass will decrease in frequency and production. The plant community upon which interpretations are primarily based is the Reference Plant Community (1.1). The Reference 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

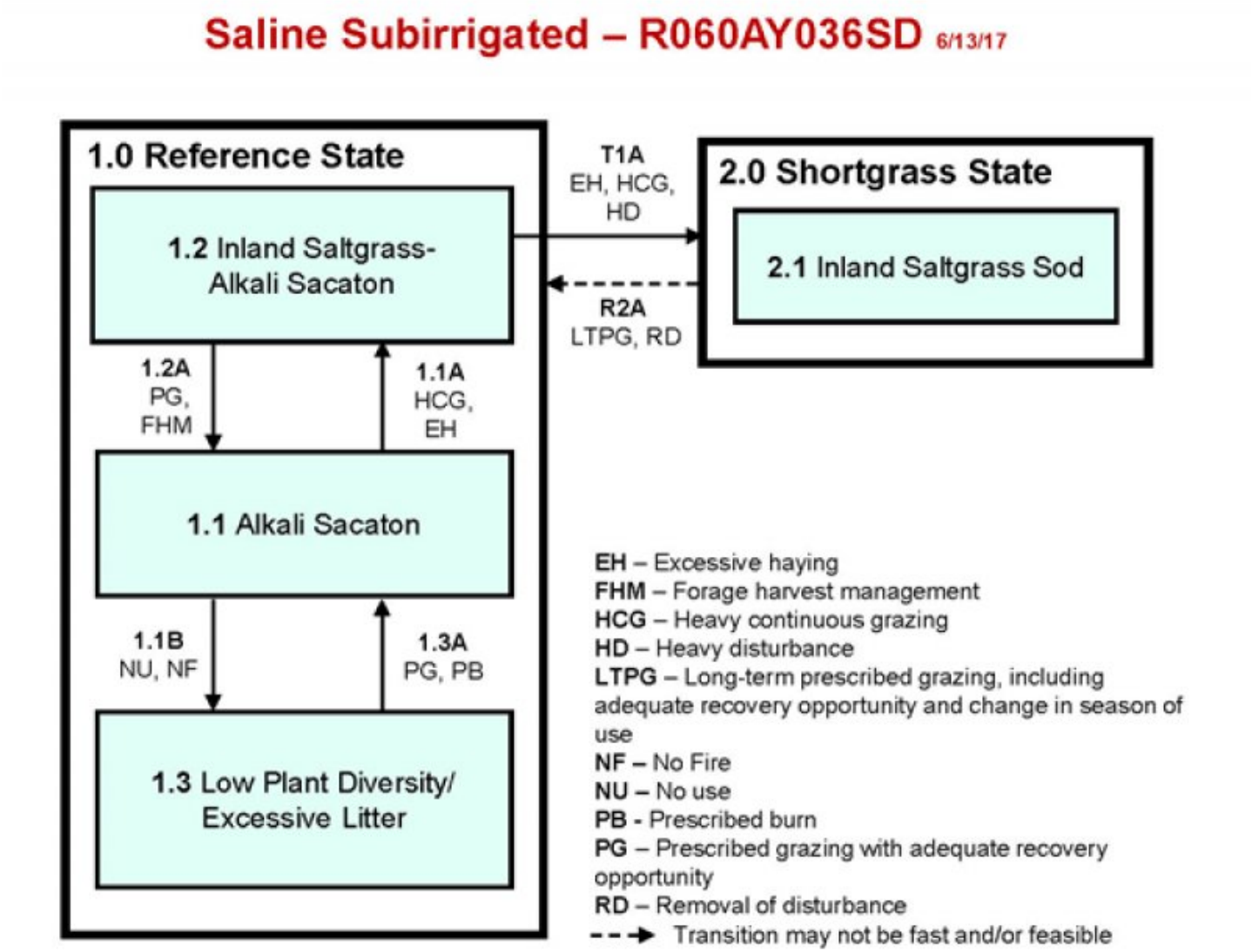

Figure 7. Saline Subirrigated - R060AY036SD

Diagram Legend - Saline Subirrigated - R060AY036SD		
T1A	Excessive haying, heavy, continuous grazing without adequate recovery, or heavy disturbance. Possible soil compaction.	
R2A	Removal of disturbance, long-term prescribed grazing with change in season of use and, adequate recovery periods. Recovery may not be fast and/or meet management goals.	
CP 1.1A	1.1 - 1.2	Heavy, continuous grazing without change in season of use or adequate recovery time, and/or excessive haying.
CP 1.1B	1.1 - 1.3	No use and no fire.
CP 1.2A	1.2 - 1.1	Prescribed grazing including change in season of use, proper stocking, and adequate time for rest and recovery, proper forage harvest management.
CP 1.3A	1.3 - 1.1	Prescribed grazing including change in season of use, proper stocking, and adequate time for rest and recovery, prescribed burning.

Figure 8. Saline Subirrigated - R060AY036SD

State 1
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 salt-tolerant warm- and cool-season grasses, forbs, and shrubs. As grazing pressure and hoof action increases, the resulting soil compaction will cause salts to accumulate closer to the soil surface and inland saltgrass will increase. Greasewood will also increase on the western side of the MLRA.

Community 1.1
Alkali Sacaton

Figure 9. Plant Community Phase 1.1

Interpretations are based primarily on the Alkali Sacaton Plant Community (1.1). This is also considered the Reference Community. This plant community can be found on areas that are properly managed with grazing and/or prescribed burning, and sometimes on areas receiving occasional short periods of deferment. This plant community consists mainly of mid- warm- and cool-season grasses. The principle dominant plants are alkali sacaton, inland saltgrass, and rhizomatous wheatgrass. Grasses of secondary importance are alkali cordgrass, slender wheatgrass, little bluestem, and foxtail barley. Bluegrasses, sedges, and spike rushes occur as an understory. Forbs such as heath aster, milkvetch, and prairie gentian are significant. This plant community is about 80 to 95 percent grasses, 5 to 15 percent grass-likes, 0 to 5 percent forbs and 0 to 2 percent shrubs. This plant community is adapted to high

salt content inherent of the soils. White crusts can occupy many areas of the soil surface due to seasonal fluctuations in the water table. Plant litter is properly distributed with very little movement off-site and natural plant mortality is very low. Most plant species have a wide range of age classes represented and reproduction is not limited.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	2100	2730	3355
Forb	0	70	145
Shrub/Vine	0	50	100
Total	**2100**	**2850**	**3600**

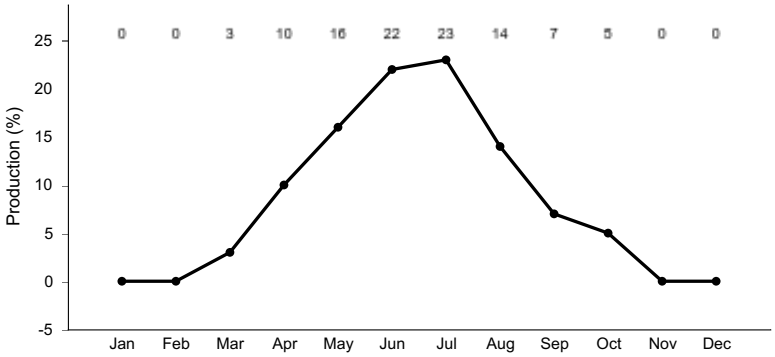

Figure 11. Plant community growth curve (percent production by month). SD6009, Pierre Shale Plains, warm season dominant, cool season subdominant. Warm season dominant, cool season subdominant, lowland..

Community 1.2
Inland Saltgrass-Alkali Sacaton

This plant community developed with relatively short-term continuous grazing without periodic deferment, or with excessive haying. Plants resistant to removal are maintaining vigor. The potential vegetation is about 80 to 95 percent grasses, 5 to 15 percent grass-like plants, 1 to 5 percent forbs, and 0 to 2 percent shrubs. Inland saltgrass and alkali sacaton have increased in abundance. Most of the palatable plants such as rhizomatous wheatgrass, slender wheatgrass, and alkali cordgrass are present but occur in lesser amounts. The soil is stable; however, plant diversity has been reduced. The water cycle, nutrient cycle, and energy flow are slightly reduced but continue to adequately function. This community indicates key management concerns. Proper grazing management techniques at this point will stabilize the community at or near the Alkali Sacaton Plant Community (1.1). Increased disturbance can easily move the community to a more degraded scenario.

Table 6. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1285	1649	2010
Shrub/Vine	0	50	100
Forb	15	51	90
Total	**1300**	**1750**	**2200**

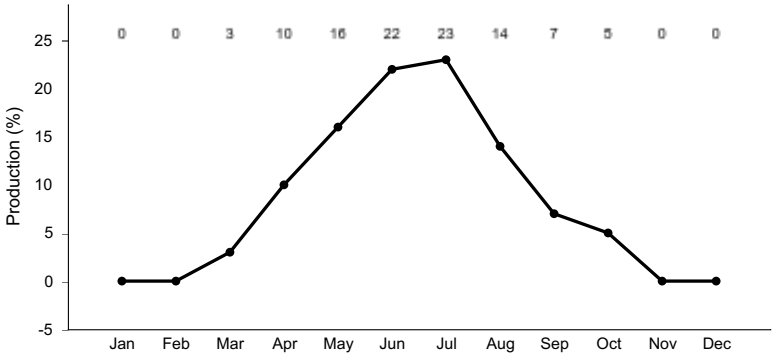

Figure 13. Plant community growth curve (percent production by month). SD6009, Pierre Shale Plains, warm season dominant, cool season subdominant. Warm season dominant, cool season subdominant, lowland..

Community 1.3
Low Plant Density/Excessive Litter

This plant community occurs after an extended period of non-use by domestic livestock. Fire is uncommon or absent. Litter amounts increase, causing plant density to decrease. Typically, bunchgrasses (alkali sacaton) have developed dead centers and rhizomatous grasses (inland saltgrass) form small colonies because of a lack of tiller stimulation. Salt crusts and/or annual plant species such as kochia and Russian thistle commonly fill bare ground areas. Plant frequency and production have decreased. The potential vegetation is about 75 to 90 percent grasses, 10 to 20 percent grass-like plants, 1 to 5 percent forbs, and 0 to 2 percent shrubs. Soil erosion is not a concern due to increased litter and landscape position.

Table 7. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1385	1843	2300
Forb	15	57	100
Shrub/Vine	0	50	100
Total	**1400**	**1950**	**2500**

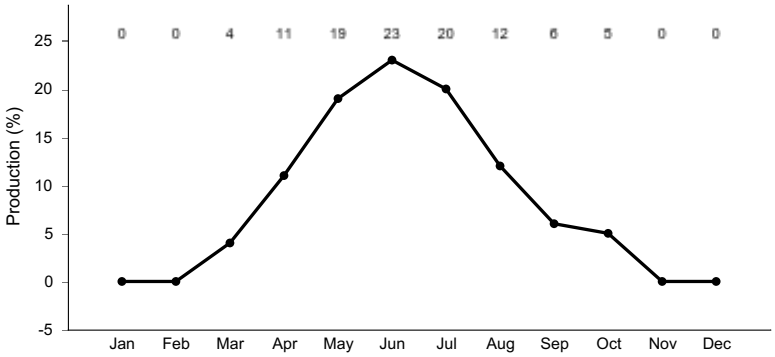

Figure 15. Plant community growth curve (percent production by month). SD6008, Pierre Shale Plains, lowland cool season/warm season co-dominant. Cool season, warm season co-dominant, lowland..

Pathway 1.1A
Community 1.1 to 1.2

Heavy, continuous, grazing without adequate recovery periods following grazing events or excessive haying will convert this plant community to the Inland Saltgrass-Alkali Sacaton Plant Community (1.2).

Pathway 1.1B
Community 1.1 to 1.3

Non-use and no fire will convert this plant community to the Low Plant Density/Excessive Litter Plant Community (1.2).

Pathway 1.2A
Community 1.2 to 1.1

Prescribed grazing with adequate recovery opportunity and proper forage harvest practices will restore this community back to the Alkali Sacaton Plant Community (1.1).

Pathway 1.3A
Community 1.3 to 1.1

Prescribed grazing or fire with adequate recovery opportunity or prescribed burning will shift this plant community towards the Alkali Sacaton Plant Community.

State 2
Shortgrass State

Heavy, long-term animal impacts have altered soil site stability, hydrologic function, and the biotic integrity of the site. Salt accumulation near or at the soil surface has reduced the vigor of many of the species present in the Reference State (1.0). This State is resistant to change and a restoration pathway may not be feasible.

Community 2.1
Inland Saltgrass Sod

This plant community developed with further continuous grazing or areas that have been tilled and abandoned. Inland saltgrass dominates this plant community and has developed into a sod-bound condition. Alkali sacaton has been greatly reduced. Slender and western wheatgrass are gone and have been replaced by increased amounts of foxtail barley. Plains pricklypear has increased. Forbs such as kochia and Russian thistle have also increased. The potential vegetation is about 80 to 95 percent grasses, 5 to 15 percent grass-like plants, 1 to 5 percent forbs, and 0 to 2 percent shrubs. The plant community lacks diversity. Evaporation has increased, resulting in a higher salt content on the soil surface. Organic matter/carbon reserves are severely diminished. It will take a long time to bring this plant community back to the Alkali Sacaton Plant Community with management alone. Restoration of this plant community would be very costly due to high salt content and the presence of a high water table.

Table 8. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	795	970	1145
Shrub/Vine	0	50	100
Forb	5	30	55
Total	**800**	**1050**	**1300**

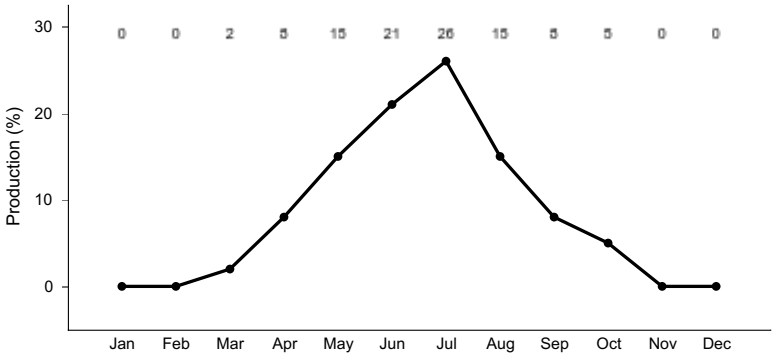

Figure 17. Plant community growth curve (percent production by month). SD6010, Pierre Shale Plains, lowland warm season dominant. Warm season

dominant, lowland..

Transition T1A
State 1 to 2

Heavy, continuous grazing, excessive haying with no recovery opportunity or heavy disturbance will shift this plant community to the Inland Saltgrass Sod Plant Community (2.1).

Restoration pathway R2A
State 2 to 1

Removal of disturbance followed by long-term prescribed grazing with adequate recovery periods between grazing events will move this plant community to the Inland Saltgrass-Alkali Sacaton Plant Community (1.2).

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	**Alkali Sacaton**			560–1120	
	alkali sacaton	SPAI	*Sporobolus airoides*	560–1120	–
2	**Inland Saltgrass**			280–560	
	saltgrass	DISP	*Distichlis spicata*	280–560	–
3	**Western Wheatgrass**			280–560	
	western wheatgrass	PASM	*Pascopyrum smithii*	280–560	–
4	**Warm-Season Grasses**			140–700	
	switchgrass	PAVI2	*Panicum virgatum*	0–420	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–280	–
	alkali cordgrass	SPGR	*Spartina gracilis*	0–280	–
	little bluestem	SCSC	*Schizachyrium scoparium*	0–140	–
	blue grama	BOGR2	*Bouteloua gracilis*	0–140	–
	scratchgrass	MUAS	*Muhlenbergia asperifolia*	0–140	–
5	**Other Native Grasses**			280–560	
	plains bluegrass	POAR3	*Poa arida*	140–280	–
	slender wheatgrass	ELTRT	*Elymus trachycaulus ssp. trachycaulus*	140–280	–
	foxtail barley	HOJU	*Hordeum jubatum*	0–140	–
	Grass, perennial	2GP	*Grass, perennial*	0–140	–
7	**Grass-likes**			140–420	
	sedge	CAREX	*Carex*	0–280	–
	spikerush	ELEOC	*Eleocharis*	0–140	–
	mountain rush	JUARL	*Juncus arcticus ssp. littoralis*	0–140	–
	rush	JUNCU	*Juncus*	0–140	–
	bulrush	SCHOE6	*Schoenoplectus*	0–140	–
Forb					
8	**Forbs**			0–140	
	Forb, perennial	2FP	*Forb, perennial*	0–56	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–28	–

	Cuman ragweed	AMPS	*Ambrosia polystachya*	0–28	
	white sagebrush	ARLU	*Artemisia ludoviciana*	0–28	–
	milkvetch	ASTRA	*Astragalus*	0–28	–
	scouringrush horsetail	EQHY	*Equisetum hyemale*	0–28	–
	showy prairie gentian	EUEXR	*Eustoma exaltatum ssp. russellianum*	0–28	–
	Pursh seepweed	SUCA2	*Suaeda calceoliformis*	0–28	–
	white heath aster	SYER	*Symphyotrichum ericoides*	0–28	–
	marsh arrowgrass	TRPA28	*Triglochin palustris*	0–28	–
	Forb, annual	2FA	*Forb, annual*	0	–
	common dandelion	TAOF	*Taraxacum officinale*	0	–
	curly dock	RUCR	*Rumex crispus*	0	–
	Russian thistle	SALSO	*Salsola*	0	–
	burningbush	BASC5	*Bassia scoparia*	0	–
	thistle	CIRSI	*Cirsium*	0	–
Shrub/Vine					
9	**Shrubs**			0–100	
	greasewood	SAVE4	*Sarcobatus vermiculatus*	0–100	–

Table 10. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Alkali Sacaton**			255–510	
	alkali sacaton	SPAI	*Sporobolus airoides*	255–510	–
2	**Inland Saltgrass**			255–510	
	saltgrass	DISP	*Distichlis spicata*	255–510	–
3	**Western Wheatgrass**			85–170	
	western wheatgrass	PASM	*Pascopyrum smithii*	85–170	–
4	**Warm-Season Grasses**			85–340	
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–170	–
	scratchgrass	MUAS	*Muhlenbergia asperifolia*	17–136	–
	switchgrass	PAVI2	*Panicum virgatum*	0–85	–
	alkali cordgrass	SPGR	*Spartina gracilis*	0–85	–
	little bluestem	SCSC	*Schizachyrium scoparium*	0–51	–
	blue grama	BOGR2	*Bouteloua gracilis*	0–51	–
5	**Other Native Grasses**			85–255	
	foxtail barley	HOJU	*Hordeum jubatum*	85–170	–
	plains bluegrass	POAR3	*Poa arida*	0–85	–
	slender wheatgrass	ELTRT	*Elymus trachycaulus ssp. trachycaulus*	0–85	–
	Grass, perennial	2GP	*Grass, perennial*	0–34	–
6	**Non-native Grasses**			0–85	
	Kentucky bluegrass	POPR	*Poa pratensis*	0–85	–
	cheatgrass	BRTE	*Bromus tectorum*	0–51	–
7	**Grass-Likes**			85–255	

	sedge	CAREX	*Carex*	0–85	–
	spikerush	ELEOC	*Eleocharis*	0–85	–
	mountain rush	JUARL	*Juncus arcticus ssp. littoralis*	0–85	–
	rush	JUNCU	*Juncus*	0–85	–
	bulrush	SCHOE6	*Schoenoplectus*	0–85	–
Forb					
8	**Forbs**			17–85	
	Forb, annual	2FA	*Forb, annual*	0–34	–
	Forb, perennial	2FP	*Forb, perennial*	0–34	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–34	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	0–34	–
	milkvetch	ASTRA	*Astragalus*	0–17	–
	burningbush	BASC5	*Bassia scoparia*	0–17	–
	thistle	CIRSI	*Cirsium*	0–17	–
	scouringrush horsetail	EQHY	*Equisetum hyemale*	0–17	–
	curly dock	RUCR	*Rumex crispus*	0–17	–
	Russian thistle	SALSO	*Salsola*	0–17	–
	Pursh seepweed	SUCA2	*Suaeda calceoliformis*	0–17	–
	white heath aster	SYER	*Symphyotrichum ericoides*	0–17	–
	common dandelion	TAOF	*Taraxacum officinale*	0–17	–
	marsh arrowgrass	TRPA28	*Triglochin palustris*	0–17	–
	showy prairie gentian	EUEXR	*Eustoma exaltatum ssp. russellianum*	0	–
Shrub/Vine					
9	**Shrubs**			0–100	
	greasewood	SAVE4	*Sarcobatus vermiculatus*	0–100	–

Table 11. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Alkali Sacaton**			285–570	
	alkali sacaton	SPAI	*Sporobolus airoides*	285–570	–
2	**Inland Saltgrass**			285–475	
	saltgrass	DISP	*Distichlis spicata*	285–475	–
3	**Western Wheatgrass**			285–475	
	western wheatgrass	PASM	*Pascopyrum smithii*	285–475	–
4	**Warm-Season Grasses**			95–380	
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–190	–
	alkali cordgrass	SPGR	*Spartina gracilis*	0–190	–
	scratchgrass	MUAS	*Muhlenbergia asperifolia*	0–95	–
	switchgrass	PAVI2	*Panicum virgatum*	0–95	–
	little bluestem	SCSC	*Schizachyrium scoparium*	0–57	–
	blue grama	BOGR2	*Bouteloua gracilis*	0–57	–
5	**Other Native Grasses**			190–475	

5	**Other Native Grasses**			190–475	
	plains bluegrass	POAR3	*Poa arida*	95–285	–
	slender wheatgrass	ELTRT	*Elymus trachycaulus ssp. trachycaulus*	95–190	–
	foxtail barley	HOJU	*Hordeum jubatum*	38–152	–
	Grass, perennial	2GP	*Grass, perennial*	0–95	–
6	**Non-native Grasses**			38–190	
	Kentucky bluegrass	POPR	*Poa pratensis*	0–152	–
	cheatgrass	BRTE	*Bromus tectorum*	0–95	–
7	**Grass-likes**			190–380	
	sedge	CAREX	*Carex*	95–285	–
	spikerush	ELEOC	*Eleocharis*	0–190	–
	mountain rush	JUARL	*Juncus arcticus ssp. littoralis*	0–190	–
	rush	JUNCU	*Juncus*	0–190	–
	bulrush	SCHOE6	*Schoenoplectus*	0–190	–
Forb					
8	**Forbs**			19–95	
	Forb, annual	2FA	*Forb, annual*	0–57	–
	Forb, perennial	2FP	*Forb, perennial*	0–38	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	0–38	–
	thistle	CIRSI	*Cirsium*	0–38	–
	Russian thistle	SALSO	*Salsola*	0–38	–
	common dandelion	TAOF	*Taraxacum officinale*	0–38	–
	marsh arrowgrass	TRPA28	*Triglochin palustris*	0–19	–
	Pursh seepweed	SUCA2	*Suaeda calceoliformis*	0–19	–
	white heath aster	SYER	*Symphyotrichum ericoides*	0–19	–
	scouringrush horsetail	EQHY	*Equisetum hyemale*	0–19	–
	showy prairie gentian	EUEXR	*Eustoma exaltatum ssp. russellianum*	0–19	–
	curly dock	RUCR	*Rumex crispus*	0–19	–
	milkvetch	ASTRA	*Astragalus*	0–19	–
	burningbush	BASC5	*Bassia scoparia*	0–19	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–19	–
Shrub/Vine					
9	**Shrubs**			0–100	
	greasewood	SAVE4	*Sarcobatus vermiculatus*	0–100	–

Table 12. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Alkali Sacaton**			0–100	
	alkali sacaton	SPAI	*Sporobolus airoides*	0–100	–
2	**Inland Saltgrass**			400–800	
	saltgrass	DISP	*Distichlis spicata*	400–800	–
4	**Warm Season Grasses**			0–50	

4	**Warm-Season Grasses**			0–50	
	scratchgrass	MUAS	*Muhlenbergia asperifolia*	0–50	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–50	–
	blue grama	BOGR2	*Bouteloua gracilis*	0–20	–
	switchgrass	PAVI2	*Panicum virgatum*	0	–
	little bluestem	SCSC	*Schizachyrium scoparium*	0	–
	alkali cordgrass	SPGR	*Spartina gracilis*	0	–
5	**Other Native Grasses**			50–150	
	foxtail barley	HOJU	*Hordeum jubatum*	30–150	–
	plains bluegrass	POAR3	*Poa arida*	0–30	–
	Grass, perennial	2GP	*Grass, perennial*	0–20	–
	slender wheatgrass	ELTRT	*Elymus trachycaulus ssp. trachycaulus*	0	–
6	**Non-native Grasses**			0–50	
	Kentucky bluegrass	POPR	*Poa pratensis*	0–40	–
	cheatgrass	BRTE	*Bromus tectorum*	0–30	–
7	**Grass-likes**			50–150	
	sedge	CAREX	*Carex*	0–50	–
	spikerush	ELEOC	*Eleocharis*	0–50	–
	mountain rush	JUARL	*Juncus arcticus ssp. littoralis*	0–50	–
	rush	JUNCU	*Juncus*	0–50	–
	bulrush	SCHOE6	*Schoenoplectus*	0–50	–
Forb					
8	**Forbs**			10–50	
	curly dock	RUCR	*Rumex crispus*	0–20	–
	Russian thistle	SALSO	*Salsola*	0–20	–
	Forb, annual	2FA	*Forb, annual*	0–20	–
	Forb, perennial	2FP	*Forb, perennial*	0–20	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	0–20	–
	burningbush	BASC5	*Bassia scoparia*	0–20	–
	thistle	CIRSI	*Cirsium*	0–20	–
	scouringrush horsetail	EQHY	*Equisetum hyemale*	0–10	–
	milkvetch	ASTRA	*Astragalus*	0–10	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–10	–
	Pursh seepweed	SUCA2	*Suaeda calceoliformis*	0–10	–
	white heath aster	SYER	*Symphyotrichum ericoides*	0–10	–
	common dandelion	TAOF	*Taraxacum officinale*	0–10	–
	marsh arrowgrass	TRPA28	*Triglochin palustris*	0–10	–
	showy prairie gentian	EUEXR	*Eustoma exaltatum ssp. russellianum*	0	–
Shrub/Vine					
9	**Shrubs**			0–100	
	greasewood	SAVE4	*Sarcobatus vermiculatus*	0–100	–

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). Therefore, 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.

Plant Community = Alkali Sacaton (1.1)
Average Annual Production (lbs./ac, air-dry) = 2850
Stocking Rate (AUM/ac) = 0.78

Plant Community = Inland Saltgrass-Alkali Sacaton (1.2)
Average Annual Production (lbs./ac, air-dry) = 1750
Stocking Rate (AUM/ac) = 0.48

Plant Community = Low Plant Density/Excessive Litter (1.3)
Average Annual Production (lbs./ac, air-dry) = 1950
Stocking Rate (AUM/ac) = 0.53

Plant Community = Inland Saltgrass Sod (2.1)
Average Annual Production (lbs./ac, air-dry) = 1000
Stocking Rate (AUM/ac) = 0.27

*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).

Total annual production on-site may contain vegetation deemed undesirable or untargeted by the grazing animal. Therefore, AUM values may have been reduced to reflect only preferred or desirable forage species.

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 herbage production on this site. The site is dominated by soils in hydrologic groups C and D. High water tables provide subirrigation of salt-tolerant vegetation. Surrounding upland areas tend to have permeable soils and surface inflow peaks on these sites are often muted. These sites do not flood or are flooded only occasionally for brief periods. 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 opportunities for upland game species. The wide variety of plants which bloom from spring until fall have an aesthetic value that appeals to visitors.

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 1997, rev.1, 2003 National Range and Pasture Handbook (NRPH). The document fully described 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, is needed to validate the information in this Provisional Ecological Site Description. 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. The final field review, peer review, quality control, and quality assurance reviews of the ESD will be needed to produce the final document.

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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 description include: Stan Boltz, Range Management Specialist, NRCS; Jill Epley, Range Management Specialist, NRCS; and Cheryl Nielsen, Range Management Specialist, NRCS.

Other references

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Contributors

Stan C. Boltz

Approval

Suzanne Mayne-Kinney, 6/25/2024

Acknowledgments

ESD Updated by Rick L. Peterson on 6/14/17

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, Mitch Iverson, Thad Berrett, Cheryl Nielsen
Contact for lead author	stanley.boltz@sd.usda.gov, 605-352-1236
Date	07/14/2008
Approved by	Suzanne Mayne-Kinney
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.

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

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.

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

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

7. **Amount of litter movement (describe size and distance expected to travel):** Litter falls in place.

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.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** A-horizon should be 1 to 7 inches thick with very dark grayish brown colors when moist. Structure typically is medium granular in the upper A-horizon.

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.

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

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

    Dominant: Mid warm-season bunchgrasses >>

    Sub-dominant: Mid cool-season rhizomatous grasses > short warm-season rhizomatous grasses = tall warm-season rhizomatous grasses > grass-likes >

    Other: Short cool-season bunchgrasses > forbs

    Additional:

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.

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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 2,100-3,500 lbs./acre (air-dry weight). Reference value production is 2,800 lbs./acre (air-dry weight).

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

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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 and grass-likes should have vigorous rhizomes or tillers.
