USDA Natural Resources
Conservation Service

Ecological site R064XY025NE
Saline Subirrigated

Accessed: 05/12/2024

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.

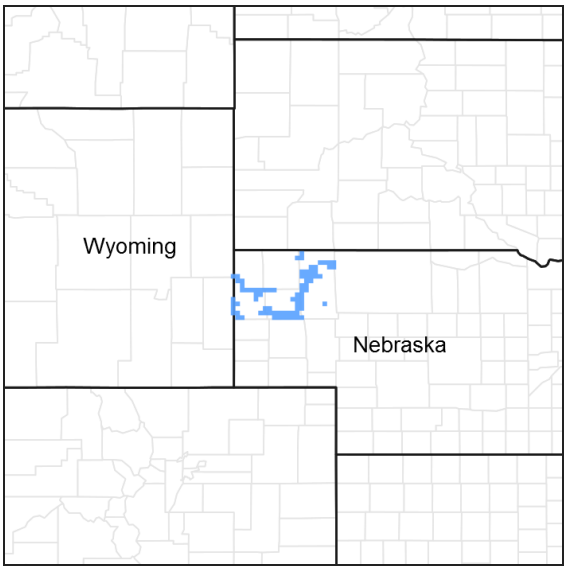


Figure 1. Mapped extent

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.

Classification relationships

Level IV Ecoregions of the Conterminous United States: 25a – Pine Ridge Escarpment, 43h – White River Badlands, and 43i – Keya Paha Tablelands.

Associated sites

R064XY002NE	**Wet Subirrigated**
R064XY022NE	**Wet Land**
R064XY024NE	**Subirrigated**
R064XY030NE	**Saline Lowland**

Similar sites

R064XY024NE	**Subirrigated** [Big bluestem, Indiangrass dominant; less prairie cordgrass; more productive.]

Table 1. Dominant plant species

Tree	Not specified

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

Physiographic features

This site occurs on nearly level to gently sloping alluvial fans and flood plains. A water table generally occurs within reach of the plants for some portion of the growing season.

Table 2. Representative physiographic features

Landforms	(1) Alluvial fan (2) Flood plain
Flooding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Flooding frequency	Rare to occasional
Ponding frequency	None
Elevation	884–1,219 m
Slope	0–3%
Water table depth	30–122 cm
Aspect	Aspect is not a significant factor

Climatic features

MLRA 64 is considered to have a continental climate – cold winters and hot summers, low humidity, light rainfall, and much sunshine. Extremes in temperature may also abound. 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 14 to 20 inches per year. The normal average annual temperature is about 47° F. January is the coldest month with average temperatures ranging from about 21° F (Wood, SD) to about 25° F (Hemingford, NE). July is the warmest month with temperatures averaging from about 70° F (Keeline 3 W, WY) to about 76° F (Wood, SD). The range of normal average monthly temperatures between the coldest and warmest months is about 55° F. This large annual range attests to the continental nature of this area's climate. Hourly winds 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)	143 days
Freeze-free period (average)	163 days
Precipitation total (average)	508 mm

Influencing water features

Cowardin, et al., 1979

Soil features

The features common to soils in this site are the loam to loamy fine sand textured surface layers and slopes of 0 to 3 percent. The soils in this site are somewhat poorly drained and formed in mixed alluvium. The surface layer is 2 to 18 inches thick. The texture of the subsurface ranges from loamy sand to silty clay loam. This site should show slight to 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.

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) Loam (2) Very fine sandy loam (3) Loamy fine sand
Family particle size	(1) Loamy
Drainage class	Somewhat poorly drained
Permeability class	Moderately slow to moderate
Soil depth	183 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	12.7–20.32 cm
Calcium carbonate equivalent (0-101.6cm)	0–15%
Electrical conductivity (0-101.6cm)	0–20 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–90
Soil reaction (1:1 water) (0-101.6cm)	6.6–9.9
Subsurface fragment volume <=3" (Depth not specified)	0–5%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

This site developed under Northern Great Plains climatic conditions, light to severe grazing by bison and other large herbivores, sporadic natural or man-caused wildfire (often of light intensities), 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.

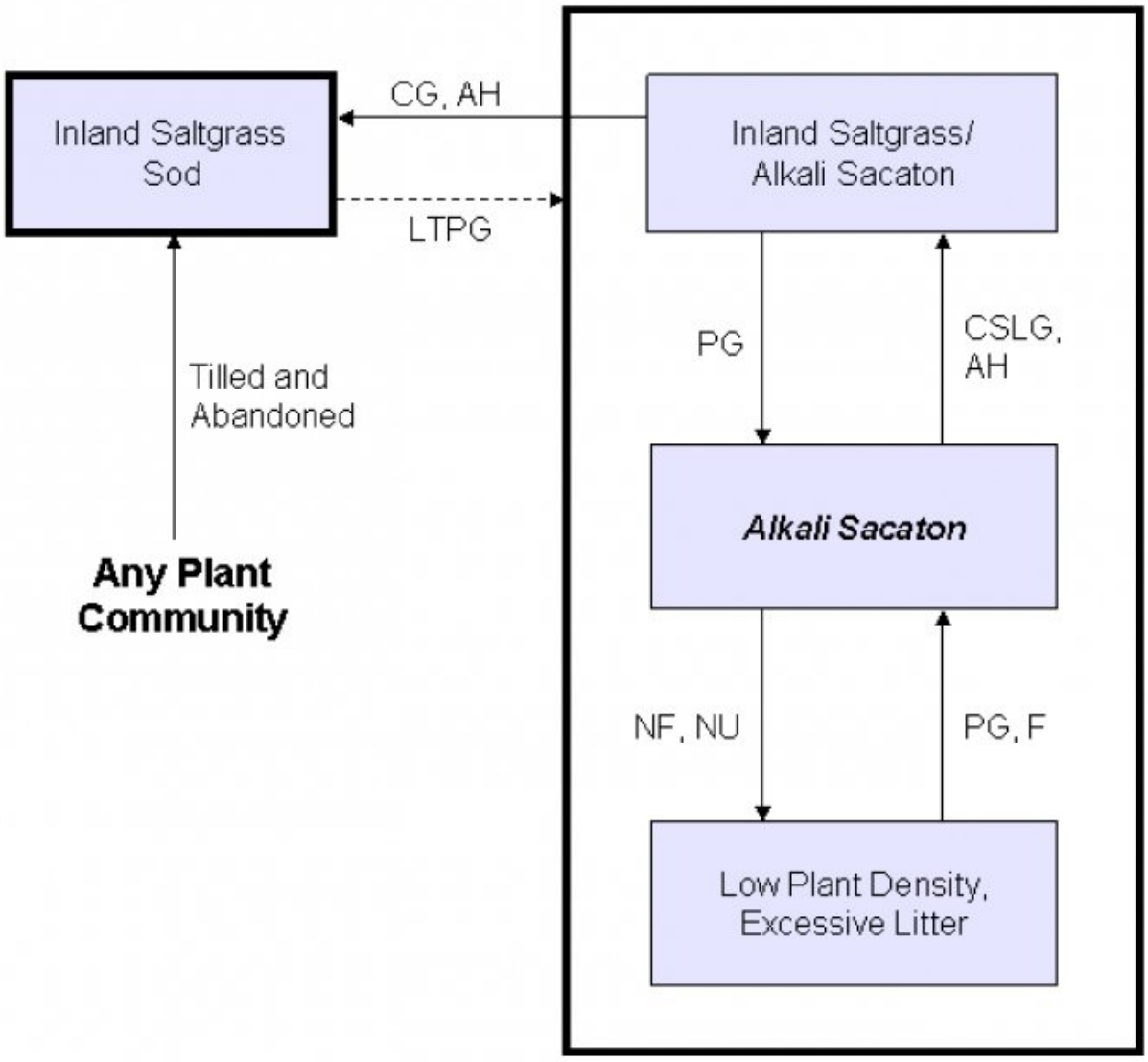
Continuous season-long grazing (during the typical growing season of May through October) and/or repeated seasonal grazing (e.g., every spring, every summer) without adequate recovery periods following each grazing occurrence causes this site to depart from the Alkali Sacaton Plant Community. Species 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.

Interpretations are primarily based on the Alkali Sacaton Plant Community. It has been determined by study of

rangeland relic areas, areas protected from excessive disturbance, and areas under long-term rotational grazing regimes. Trends in plant community dynamics ranging from heavily grazed to lightly grazed areas, seasonal use pastures, and historical accounts also have been 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



AH - Annual haying; **CSLG** - Continuous season-long grazing (grazing a unit for an entire growing season); **F-** Fire; **LTPG –** Long term prescribed grazing (> 40 years); **NF-** No fire; **NU** - Non-use; **PG** - Prescribed grazing (planned, controlled harvest of vegetation with grazing or browsing animals – see FOTG, Section IV, 528).

State 1
Alkali Sacaton

Community 1.1
Alkali Sacaton

Interpretations are primarily based on the Alkali Sacaton Plant Community (this is also considered to be climax). 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 rest. This plant community consists mainly of mid warm and cool season grasses. The principle dominant plants are alkali sacaton, inland saltgrass and western wheatgrass. Grasses of secondary importance are alkali cordgrass, slender wheatgrass, little bluestem and foxtail barley. Blue grasses, 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% grasses, 15% grass-likes and 5% forbs by air-dry weight. 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. This is a healthy and sustainable plant community in terms of soil stability, watershed function and biological integrity.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	2202	2746	3256
Shrub/Vine	151	314	504
Forb	–	78	163
Total	**2353**	**3138**	**3923**

Figure 5. Plant community growth curve (percent production by month). NE6409, Pine Ridge/Badlands, warm-season dominant, cool-season sub-dominant. Warm-season dominant, cool-season sub-dominant, lowlands.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		3	8	18	27	23	12	6	3		

State 2
Inland Saltgrass/Alkali Sacaton

Community 2.1
Inland Saltgrass/Alkali Sacaton

This plant community developed with relatively short term continuous grazing without periodic rest, or with annual haying. Plants resistant to removal are maintaining vigor. The potential vegetation is about 80% grasses, 15% grass-like plants, and 5% forbs. Inland saltgrass is increasing and alkali sacaton has decreased in abundance. Most of the palatable plants such as western wheatgrass, slender wheatgrass, and alkali cordgrass are present but occur in lesser amounts. The soil is stable; however, water cycle, nutrient cycle and energy flow are altered 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. Increased disturbance can easily move the community to a more degraded scenario.

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1367	1668	1945
Shrub/Vine	90	191	308
Forb	–	47	101
Total	**1457**	**1906**	**2354**

Figure 7. Plant community growth curve (percent production by month). NE6410, Pine Ridge/Badlands, lowland warm-season dominant. Warm-season dominant, lowland.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		3	7	15	25	25	17	6	2		

State 3
Inland Saltgrass Sod

Community 3.1
Inland Saltgrass Sod

This plant community developed with further continuous grazing or areas that have been tilled and abandoned. Inland saltgrass dominates 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 and non-native plants such as kochia and Russian thistle. The potential vegetation is about 80% grasses, 15% grass-like plants, and 5% forbs. 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. Renovation of this plant community would be very costly due to high salt content and water table.

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	846	981	1110
Shrub/Vine	50	112	174
Forb	–	28	62
Total	**896**	**1121**	**1346**

Figure 9. Plant community growth curve (percent production by month). NE6410, Pine Ridge/Badlands, lowland warm-season dominant. Warm-season dominant, lowland.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		3	7	15	25	25	17	6	2		

State 4
Low Plant Density, Excessive Litter

Community 4.1
Low Plant Density, Excessive Litter

This plant community occurs after extended periods of non-use by domestic livestock. Fire is rare or has been eliminated. Litter amounts have increased 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% grasses,

20% grass-like plants, and 5% forbs. Soil erosion is not a concern due to increased litter levels and landscape position.

Table 8. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1362	1757	2130
Shrub/Vine	207	318	448
Forb	–	54	112
Total	**1569**	**2129**	**2690**

Figure 11. Plant community growth curve (percent production by month). NE6409, Pine Ridge/Badlands, warm-season dominant, cool-season sub-dominant. Warm-season dominant, cool-season sub-dominant, lowlands.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		3	8	18	27	23	12	6	3		

Additional community tables

Table 9. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Alkali Sacaton**			628–1255	
	alkali sacaton	SPAI	*Sporobolus airoides*	628–1255	–
2	**Inland Saltgrass**			314–628	
	saltgrass	DISP	*Distichlis spicata*	314–628	–
3	**Western Wheatgrass**			314–628	
	western wheatgrass	PASM	*Pascopyrum smithii*	314–628	–
4	**Warm-Season Grasses**			157–785	
	switchgrass	PAVI2	*Panicum virgatum*	0–471	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–314	–
	alkali cordgrass	SPGR	*Spartina gracilis*	0–314	–
	little bluestem	SCSC	*Schizachyrium scoparium*	0–157	–
	blue grama	BOGR2	*Bouteloua gracilis*	0–157	–
	scratchgrass	MUAS	*Muhlenbergia asperifolia*	0–157	–
5	**Other Native Grasses**			314–628	
	plains bluegrass	POAR3	*Poa arida*	157–314	–
	slender wheatgrass	ELTRT	*Elymus trachycaulus ssp. trachycaulus*	157–314	–
	foxtail barley	HOJU	*Hordeum jubatum*	0–157	–
	Grass, perennial	2GP	*Grass, perennial*	0–157	–
7	**Grass-Likes**			157–471	
	sedge	CAREX	*Carex*	0–314	–
	spikerush	ELEOC	*Eleocharis*	0–157	–
	rush	JUNCU	*Juncus*	0–157	–
	bulrush	SCHOE6	*Schoenoplectus*	0–157	–
Forb					
8	**Forbs**			0–157	
	Forb, perennial	2FP	*Forb, perennial*	0–63	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–31	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	0–31	–
	milkvetch	ASTRA	*Astragalus*	0–31	–
	scouringrush horsetail	EQHY	*Equisetum hyemale*	0–31	–
	showy prairie gentian	EUEXR	*Eustoma exaltatum ssp. russellianum*	0–31	–
	Pursh seepweed	SUCA2	*Suaeda calceoliformis*	0–31	–
	white heath aster	SYER	*Symphyotrichum ericoides*	0–31	–
	common dandelion	TAOF	*Taraxacum officinale*	0–31	–

Table 10. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Alkali Sacaton**			286–381	
	alkali sacaton	SPAI	*Sporobolus airoides*	286–381	–
2	**Inland Saltgrass**			572–762	
	saltgrass	DISP	*Distichlis spicata*	572–762	–
3	**Western Wheatgrass**			0–95	
	western wheatgrass	PASM	*Pascopyrum smithii*	0–95	–
4	**Warm-Season Grasses**			38–191	
	scratchgrass	MUAS	*Muhlenbergia asperifolia*	0–95	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–95	–
	alkali cordgrass	SPGR	*Spartina gracilis*	0–95	–
	switchgrass	PAVI2	*Panicum virgatum*	0–38	–
	little bluestem	SCSC	*Schizachyrium scoparium*	0–38	–
	blue grama	BOGR2	*Bouteloua gracilis*	0–38	–
5	**Other Native Grasses**			95–286	
	foxtail barley	HOJU	*Hordeum jubatum*	95–191	–
	plains bluegrass	POAR3	*Poa arida*	0–95	–
	slender wheatgrass	ELTRT	*Elymus trachycaulus ssp. trachycaulus*	0–95	–
	Grass, perennial	2GP	*Grass, perennial*	0–38	–
6	**Non-Native Grasses**			0–95	
	Kentucky bluegrass	POPR	*Poa pratensis*	0–95	–
7	**Grass-Likes**			95–286	
	sedge	CAREX	*Carex*	0–191	–
	spikerush	ELEOC	*Eleocharis*	0–95	–
	rush	JUNCU	*Juncus*	0–95	–
	bulrush	SCHOE6	*Schoenoplectus*	0–95	–
Forb					
8	**Forbs**			0–95	
	Forb, perennial	2FP	*Forb, perennial*	0–38	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–38	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	0–38	–
	milkvetch	ASTRA	*Astragalus*	0–19	–
	scouringrush horsetail	EQHY	*Equisetum hyemale*	0–19	–
	showy prairie gentian	EUEXR	*Eustoma exaltatum ssp. russellianum*	0–19	–
	Pursh seepweed	SUCA2	*Suaeda calceoliformis*	0–19	–
	white heath aster	SYER	*Symphyotrichum ericoides*	0–19	–
	common dandelion	TAOF	*Taraxacum officinale*	0–19	–

Table 11. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Alkali Sacaton**			0–112	
	alkali sacaton	SPAI	*Sporobolus airoides*	0–112	–
2	**Inland Saltgrass**			673–1009	
	saltgrass	DISP	*Distichlis spicata*	673–1009	–
4	**Warm-Season Grasses**			0–56	
	blue grama	BOGR2	*Bouteloua gracilis*	0–22	–
	scratchgrass	MUAS	*Muhlenbergia asperifolia*	0–22	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–22	–
5	**Other Native Grasses**			56–168	
	foxtail barley	HOJU	*Hordeum jubatum*	56–168	–
	plains bluegrass	POAR3	*Poa arida*	0–22	–
	Grass, perennial	2GP	*Grass, perennial*	0–22	–
6	**Non-Native Grasses**			0–22	
	Kentucky bluegrass	POPR	*Poa pratensis*	0–22	–
7	**Grass-Likes**			56–168	
	sedge	CAREX	*Carex*	0–56	–
	spikerush	ELEOC	*Eleocharis*	0–56	–
	rush	JUNCU	*Juncus*	0–56	–
	bulrush	SCHOE6	*Schoenoplectus*	0–56	–
Forb					
8	**Forbs**			0–56	
	Forb, perennial	2FP	*Forb, perennial*	0–22	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–22	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	0–22	–
	milkvetch	ASTRA	*Astragalus*	0–11	–
	scouringrush horsetail	EQHY	*Equisetum hyemale*	0–11	–
	showy prairie gentian	EUEXR	*Eustoma exaltatum ssp. russellianum*	0–11	–
	Pursh seepweed	SUCA2	*Suaeda calceoliformis*	0–11	–
	white heath aster	SYER	*Symphyotrichum ericoides*	0–11	–
	common dandelion	TAOF	*Taraxacum officinale*	0–11	–

Table 12. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Alkali Sacaton**			319–639	
	alkali sacaton	SPAI	*Sporobolus airoides*	319–639	–
2	**Inland Saltgrass**			319–639	
	saltgrass	DISP	*Distichlis spicata*	319–639	–
3	**Western Wheatgrass**			213–426	
	western wheatgrass	PASM	*Pascopyrum smithii*	213–426	–
4	**Warm-Season Grasses**			213–532	
	switchgrass	PAVI2	*Panicum virgatum*	106–319	–
	little bluestem	SCSC	*Schizachyrium scoparium*	106–213	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–106	–
	alkali cordgrass	SPGR	*Spartina gracilis*	0–106	–
	scratchgrass	MUAS	*Muhlenbergia asperifolia*	0–106	–
	blue grama	BOGR2	*Bouteloua gracilis*	0–43	–
5	**Other Native Grasses**			319–532	
	slender wheatgrass	ELTRT	*Elymus trachycaulus ssp. trachycaulus*	213–319	–
	plains bluegrass	POAR3	*Poa arida*	106–213	–
	foxtail barley	HOJU	*Hordeum jubatum*	0–106	–
	Grass, perennial	2GP	*Grass, perennial*	0–43	–
6	**Non-Native Grasses**			0–43	
	Kentucky bluegrass	POPR	*Poa pratensis*	0–43	–
7	**Grass-Likes**			213–426	
	sedge	CAREX	*Carex*	106–319	–
	spikerush	ELEOC	*Eleocharis*	0–213	–
	rush	JUNCU	*Juncus*	0–213	–
	bulrush	SCHOE6	*Schoenoplectus*	0–213	–
Forb					
8	**Forbs**			0–106	
	Forb, perennial	2FP	*Forb, perennial*	0–43	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	0–21	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	0–21	–
	milkvetch	ASTRA	*Astragalus*	0–21	–
	scouringrush horsetail	EQHY	*Equisetum hyemale*	0–21	–
	showy prairie gentian	EUEXR	*Eustoma exaltatum ssp. russellianum*	0–21	–
	Pursh seepweed	SUCA2	*Suaeda calceoliformis*	0–21	–
	white heath aster	SYER	*Symphyotrichum ericoides*	0–21	–
	common dandelion	TAOF	*Taraxacum officinale*	0–21	–

Hydrological functions

Forage production on these sites is limited by saline conditions. Proper management is critical to the continued

productivity of these sites. Grass reestablishment on overgrazed or tilled sites is often slow and difficult because increased evaporation (from exposed soil surfaces) causes increased salt concentration at the soil surface. The soils on this site are in hydrologic soil group C, with localized areas in group D. Infiltration rates for these soils are high, but 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.

Recreational uses

This site provides hunting opportunities for upland game species. The wide variety of plants which bloom from spring until fall have an esthetic value that appeals to visitors.

Wood products

No appreciable wood products are present on the site.

Other products

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

Inventory data references

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range-trained personnel were also used. Those involved in developing this site include: Stan Boltz, Range Management Specialist, NRCS; Jill Epley, Range Management Specialist, NRCS; Rick Peterson, Range Management Specialist, NRCS; David Steffen, Range Management Specialist, NRCS; Jeff Vander Wilt; Range Management Specialist, NRCS; Phil Young, Soil Scientist, NRCS.

Other references

High Plains Regional Climate Center, University of Nebraska, 830728 Chase Hall, Lincoln, NE 68583-0728. (http://hpccsun.unl.edu)
USDA, NRCS. National Water and Climate Center, 101 SW Main, Suite 1600, Portland, OR 97204-3224. (http://wcc.nrcs.usda.gov)
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Contributors

SCB

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

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Date	03/31/2004
Approved by	Stan Boltz
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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):** Bare ground is typically less than 5 percent.

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 > cool-season rhizomatous grasses = short, warm-season grasses >

    Sub-dominant: Tall, warm-season rhizomatous grasses = grass-like species >

    Other: Forbs = cool-season bunchgrasses

    Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Very little evidence of decadence or mortality.

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14. **Average percent litter cover (%) and depth (in):** Litter cover is typically 50 to 80 percent, and depth of litter ranges from 0.25 to 0.5 inches.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Total annual production ranges from 2,100 to 3,500 pounds/acre, with the reference values being 2,800 pounds/acre (air-dry basis).

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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; also Kentucky bluegrass. Russian olive can dominate this site in localized areas. Most invasive species will occupy the perimeter of this site.

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17. **Perennial plant reproductive capability:** Perennial grasses and grass-likes should have vigorous rhizomes or tillers.
