USDA Natural Resources Conservation Service

Ecological site R064XY030NE
Saline Lowland

Accessed: 05/10/2024

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.

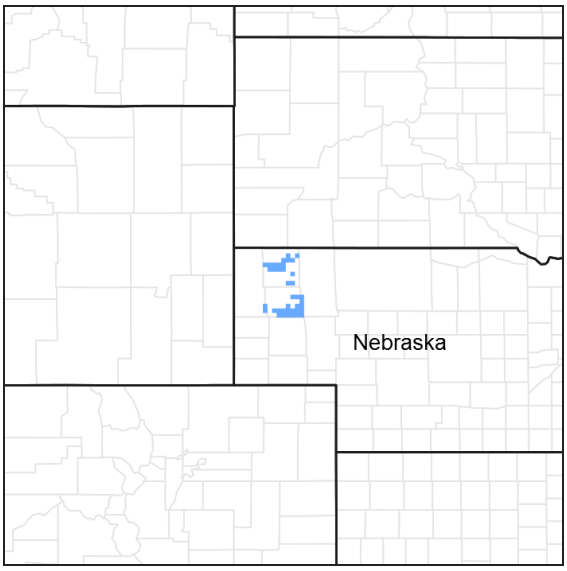


Figure 1. Mapped extent

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

R064XY025NE	**Saline Subirrigated**
R064XY045NE	**Dense Clay**
R064XY046NE	**Thin Claypan**

Similar sites

R064XY025NE	**Saline Subirrigated**

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified

Herbaceous	(1) *Pascopyrum smithii* (2) *Elymus lanceolatus ssp. lanceolatus*

Physiographic features

This site occurs on nearly level to gently sloping alluvial fans and flood plains.

Table 2. Representative physiographic features

Landforms	(1) Alluvial fan (2) Flood plain
Flooding duration	Very brief (4 to 48 hours)
Flooding frequency	None to rare
Ponding frequency	None
Elevation	884–1,219 m
Slope	0–3%
Water table depth	122–183 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

Soil features

The soils of this site are very deep moderately well to well drained soils that formed in alluvium. Surface layers vary from 3 to 6 inches thick. These soils have moderately slow to very slow permeability and are moderately to strongly saline and/or alkaline. Higher soluble salt concentrations may be found in the subsoil. The surface layer will be highly variable and vary from 2 to 18 inches in thickness. The surface texture ranges from loamy fine sand to silty

clay loam. A fluctuating water table occurs in these areas within 4 feet of the surface. These areas are subject to occasional overflow. 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) Silty clay loam (2) Loam (3) Silt loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Very slow to moderately slow
Soil depth	203 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)	4–16 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–50
Soil reaction (1:1 water) (0-101.6cm)	6.1–9.6
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

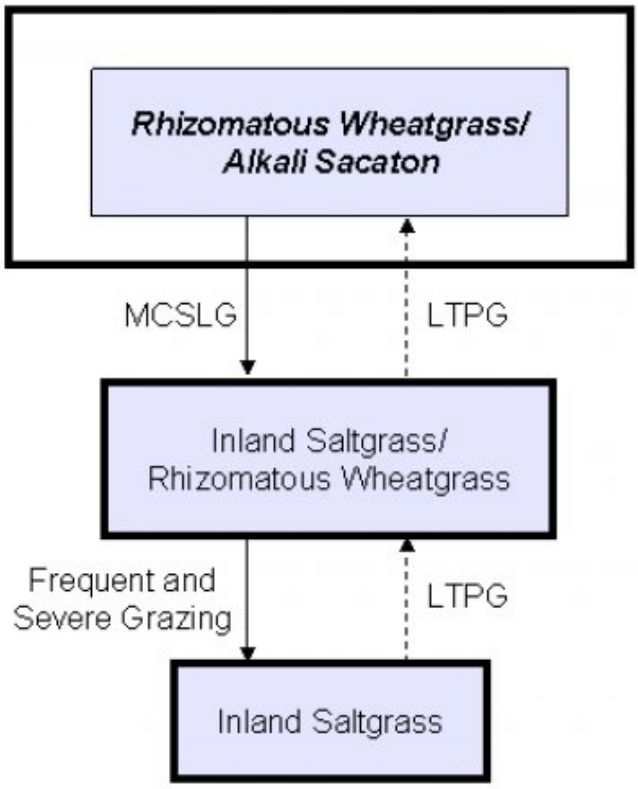
This site developed under Northern Great Plains climatic conditions, light to severe grazing by bison and other large herbivores, sporadic natural or man-caused wildfire (often of light intensities), and other biotic and abiotic factors that typically influence soil/site development. Changes will occur 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.

Shrubs such as greasewood and rubber rabbitbrush will occur in higher amounts on the western portions of where this site occurs.
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 Rhizomatous Wheatgrass/Alkali Sacaton Plant Community. Species such as inland saltgrass and foxtail barley increase, and annual species may invade the site. Grasses such as alkali sacaton, rhizomatous wheatgrasses, and Nuttall's alkaligrass will decrease in frequency and production. The high salt content of the soils greatly influences the plant species present. Plant vigor can vary on a year-to-year basis in relation to current precipitation amounts, which influences the translocation of salts in the soil profile. Typically only salt tolerant plants are found on this site.

Interpretations are primarily based on the Rhizomatous Wheatgrass/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



Frequent and Severe Grazing - Frequent and severe utilization of the cool-season mid grasses during the growing season; **LTPG** - Long-term prescribed grazing; **MCSLG** - Moderate, continuous season-long grazing (moderate levels of grazing a unit for an entire growing season); **PG** - Prescribed grazing (planned, controlled harvest of vegetation with grazing or browsing animals – see FOTG, Section IV, 528).

State 1
Rhizomatous Wheatgrass/Alkali Sacaton

Community 1.1
Rhizomatous Wheatgrass/Alkali Sacaton

Interpretations are based primarily on the Rhizomatous Wheatgrass/Alkali Sacaton Plant Community (this is also considered to be climax). Potential vegetation is about 80% grasses or grass-like plants, 10% forbs and 10% woody plants. Saline tolerant grasses dominate the plant community. The major grasses include rhizomatous wheatgrasses, alkali sacaton, Nuttall's alkaligrass, alkali and/or prairie cordgrass and inland saltgrass. Woody plants are greasewood, fourwing saltbush, rubber rabbitbrush, cottonwood, and Gardner's saltbush. Shrubs such as greasewood and rubber rabbitbrush will occur in higher amounts on the western portions of where this site occurs. 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 at the sites potential. Plant litter is properly distributed with some movement off-site and natural plant mortality is low. The diversity in plant species allows for high drought tolerance.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	2163	2432	2640
Shrub/Vine	151	392	673
Forb	151	235	336
Tree	–	78	163
Total	**2465**	**3137**	**3812**

Figure 5. Plant community growth curve (percent production by month). NE6408, Pine Ridge/Badlands, lowland cool-season/warm-season co-dominant. Cool-season, warm-season co-dominant, lowland.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		5	12	20	25	19	11	5	3		

State 2
Inland Saltgrass/Rhizomatous Wheatgrass

Community 2.1
Inland Saltgrass/Rhizomatous Wheatgrass

This plant community occurs as a result of moderate, continuous season-long grazing. Grasses comprise 85-90%, forbs 0-10 and shrubs 0-5. Dominant grasses include inland saltgrass, western wheatgrass and alkali and/or prairie cordgrass. Other secondary grasses and grass-like plants include blue grama and sedges. Forbs such asters and saltwort may occur, and non-native forbs such as cocklebur may invade this plant community. When compared to the Rhizomatous Wheatgrass/Alkali Sacaton Plant Community, saltgrass has increased. Alkali sacaton, alkaligrass and woody vegetation has been greatly diminished.

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1009	1675	2309
Forb	95	202	336
Shrub/Vine	17	111	207
Tree	–	30	62
Total	**1121**	**2018**	**2914**

Figure 7. 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 3
Inland Saltgrass

Community 3.1
Inland Saltgrass

This plant community is the result of long-term improper grazing use. Inland saltgrass dominates this plant community. Other grasses and grass-likes that occur include alkali bluegrass, foxtail barley and sedges. Forbs common in this plant community are Pursh seepweed, red saltwort and povertyweed. Bare ground has increased, and production has decreased. The soils of this plant community are not well protected. The biotic integrity is compromised by introduced species, loss of the dominant climax species and bare ground. Excessive runoff may occur.

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	824	1130	1429
Forb	62	135	207
Shrub/Vine	118	74	140
Tree	–	7	17
Total	**1004**	**1346**	**1793**

Figure 9. 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 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Rhizomatous Wheatgrasses**			628–1255	
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	628–1255	–
	western wheatgrass	PASM	*Pascopyrum smithii*	628–1255	–
2	**Cordgrass**			314–942	
	alkali cordgrass	SPGR	*Spartina gracilis*	314–942	–
	prairie cordgrass	SPPE	*Spartina pectinata*	314–942	–
3	**Sacaton**			314–785	
	alkali sacaton	SPAI	*Sporobolus airoides*	314–785	–
4	**Other Native Grasses**			314–628	
	Nuttall's alkaligrass	PUNU2	*Puccinellia nuttalliana*	314–628	–
	saltgrass	DISP	*Distichlis spicata*	157–471	–
	squirreltail	ELEL5	*Elymus elymoides*	0–157	–
	spikerush	ELEOC	*Eleocharis*	0–157	–
	slender wheatgrass	ELTRT	*Elymus trachycaulus ssp. trachycaulus*	0–157	–
	foxtail barley	HOJU	*Hordeum jubatum*	0–157	–
	rush	JUNCU	*Juncus*	0–157	–
	Grass, perennial	2GP	*Grass, perennial*	0–157	–
	sedge	CAREX	*Carex*	31–157	–
	bulrush	SCHOE6	*Schoenoplectus*	0–157	–
Forb					
6	**Forbs**			157–314	
	Forb, perennial	2FP	*Forb, perennial*	0–157	–
	aster	ASTER	*Aster*	0–157	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	0–157	–
	annual marsh elder	IVAN2	*Iva annua*	0–157	–
	povertyweed	IVAX	*Iva axillaris*	0–157	–
	red swampfire	SARU	*Salicornia rubra*	0–157	–
	Pursh seepweed	SUCA2	*Suaeda calceoliformis*	0–157	–
Shrub/Vine					
7	**Shrubs**			157–628	
	fourwing saltbush	ATCA2	*Atriplex canescens*	0–314	–
	Gardner's saltbush	ATGA	*Atriplex gardneri*	0–314	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–157	–
	Subshrub (<.5m)	2SUBS	*Subshrub (<.5m)*	0–157	–
Tree					
8	**Trees**			0–157	
	plains cottonwood	PODEM	*Populus deltoides ssp. monilifera*	0–157	–

Table 9. Community 2.1 plant community composition

				Annual Production	Foliar Cover

Group	Common Name	Symbol	Scientific Name	(Kg/Hectare)	(%)
Grass/Grasslike					
1	**Rhizomatous Wheatgrasses**			303–605	
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	303–605	–
	western wheatgrass	PASM	*Pascopyrum smithii*	303–605	–
2	**Cordgrass**			40–202	
	alkali cordgrass	SPGR	*Spartina gracilis*	40–202	–
	prairie cordgrass	SPPE	*Spartina pectinata*	40–202	–
3	**Sacaton**			0–202	
	alkali sacaton	SPAI	*Sporobolus airoides*	0–202	–
4	**Other Native Grasses**			404–807	
	saltgrass	DISP	*Distichlis spicata*	303–605	–
	foxtail barley	HOJU	*Hordeum jubatum*	40–202	–
	sedge	CAREX	*Carex*	101–202	–
	rush	JUNCU	*Juncus*	20–101	–
	Nuttall's alkaligrass	PUNU2	*Puccinellia nuttalliana*	0–101	–
	bulrush	SCHOE6	*Schoenoplectus*	20–101	–
	squirreltail	ELEL5	*Elymus elymoides*	0–101	–
	spikerush	ELEOC	*Eleocharis*	20–101	–
	Grass, perennial	2GP	*Grass, perennial*	0–61	–
	slender wheatgrass	ELTRT	*Elymus trachycaulus ssp. trachycaulus*	0–40	–
5	**Non-Native Grasses**			20–101	
	bluegrass	POA	*Poa*	0–101	–
	cheatgrass	BRTE	*Bromus tectorum*	20–61	–
Forb					
6	**Forbs**			101–303	
	Forb, annual	2FA	*Forb, annual*	0–101	–
	Forb, perennial	2FP	*Forb, perennial*	0–101	–
	aster	ASTER	*Aster*	20–101	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	20–101	–
	curlycup gumweed	GRSQ	*Grindelia squarrosa*	20–101	–
	annual marsh elder	IVAN2	*Iva annua*	20–101	–
	povertyweed	IVAX	*Iva axillaris*	20–101	–
	red swampfire	SARU	*Salicornia rubra*	0–101	–
	Pursh seepweed	SUCA2	*Suaeda calceoliformis*	20–101	–
	cocklebur	XANTH2	*Xanthium*	0–101	–
	lambsquarters	CHAL7	*Chenopodium album*	0–61	–
Shrub/Vine					
7	**Shrubs**			20–202	
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	20–202	–
	Subshrub (<.5m)	2SUBS	*Subshrub (<.5m)*	0–101	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	0–61	–
	Gardner's saltbush	ATGA	*Atriplex gardneri*	0–61	–

Tree					
8	**Trees**			0–61	
	plains cottonwood	PODEM	*Populus deltoides ssp. monilifera*	0–61	–

Table 10. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Rhizomatous Wheatgrasses**			13–135	
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	13–135	–
	western wheatgrass	PASM	*Pascopyrum smithii*	13–135	–
2	**Cordgrass**			0–40	
	alkali cordgrass	SPGR	*Spartina gracilis*	0–40	–
	prairie cordgrass	SPPE	*Spartina pectinata*	0–40	–
4	**Other Native Grasses**			538–1076	
	saltgrass	DISP	*Distichlis spicata*	404–942	–
	foxtail barley	HOJU	*Hordeum jubatum*	67–269	–
	sedge	CAREX	*Carex*	67–202	–
	rush	JUNCU	*Juncus*	13–67	–
	bulrush	SCHOE6	*Schoenoplectus*	13–67	–
	squirreltail	ELEL5	*Elymus elymoides*	0–67	–
	spikerush	ELEOC	*Eleocharis*	13–67	–
	Grass, perennial	2GP	*Grass, perennial*	0–27	–
5	**Non-Native Grasses**			13–135	
	bluegrass	POA	*Poa*	0–135	–
	cheatgrass	BRTE	*Bromus tectorum*	13–67	–
Forb					
6	**Forbs**			67–202	
	Forb, annual	2FA	*Forb, annual*	0–67	–
	Forb, perennial	2FP	*Forb, perennial*	0–67	–
	aster	ASTER	*Aster*	13–67	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	13–67	–
	curlycup gumweed	GRSQ	*Grindelia squarrosa*	13–67	–
	annual marsh elder	IVAN2	*Iva annua*	13–67	–
	povertyweed	IVAX	*Iva axillaris*	13–67	–
	red swampfire	SARU	*Salicornia rubra*	0–67	–
	Pursh seepweed	SUCA2	*Suaeda calceoliformis*	13–67	–
	cocklebur	XANTH2	*Xanthium*	0–67	–
	lambsquarters	CHAL7	*Chenopodium album*	0–40	–
Shrub/Vine					
7	**Shrubs**			13–135	
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	13–135	–
	Subshrub (<.5m)	2SUBS	*Subshrub (<.5m)*	0–40	–
Tree					
8	**Trees**			0–13	
	plains cottonwood	PODEM	*Populus deltoides ssp. monilifera*	0–13	–

Hydrological functions

Water is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group B and C, with localized areas in hydrologic group D.. Infiltration ranges from low to very low. 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% ground cover have the greatest potential for high infiltration and lower runoff. An example of an exception would be where short grasses form a strong sod and dominate the site. Areas where ground cover is less than 50% have the greatest potential to have reduced infiltration and higher runoff (refer to Section 4, NRCS National Engineering Handbook for runoff quantities and hydrologic curves).

Recreational uses

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

Wood products

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)
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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 normally less than 10 percent. Some slickspots may be associated with this site, and are not a part of this site. These slickspots will have higher amounts of bare ground and salt crusting.

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 typically 3 or greater. Surface organic matter adheres to the soil surface. Soil surface fragments will typically retain structure at least for short periods when dipped in distilled water. Some fragments will dissolbe in less than 1 minute.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface horizon is a dark gray E-horizon (leached) 3 to 6 inches thick. Structure is platy parting to fine granular.

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 – when dry, B horizons can be hard or pan-like, 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: Mid, cool-season rhizomatous grasses > mid and tall, warm-season rhizomatous grasses >

    Sub-dominant: Mid, warm-season bunchgrasses > mid, cool-season bunchgrasses = shrubs > short, warm-season grasses >

    Other: Forbs > grass-like species = trees

    Additional: Other grasses in other functional groups occur in minor amounts.

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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):** About 50 to 70 percent litter cover, litter in contact with soil surface. Depth of litter is about 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 2,200 pounds/acre to 3,400 pounds/acre, with the reference value 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; 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.
