Ecological site R060AY007SD
Saline Lowland

Accessed: 05/18/2024

General information

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

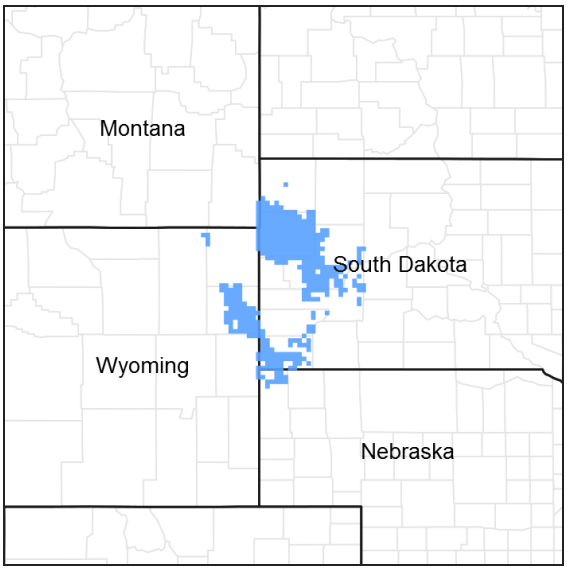


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

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

MLRA Notes:
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 Lowland ecological site occurs throughout MLRA 60A. It is a run-in site located on gentle sloping drainageways on upland landscapes and nearly level flood plains. Slopes range from 0 to 2 percent. The soils are formed in clayey alluvium, are very poorly drained, and have salt accumulation at 4 to 15 inches below the surface. The site has a seasonal water table between 1 and 3 foot in depth and permanently moist soil at 4 to 5 feet. Vegetation in the Reference State (1.0) consists of salt-tolerant, cool- and warm-season grasses, forbs, and shrubs.

Associated sites

R060AY015SD	**Thin Claypan** The Thin Claypan site can be found adjacent to the Saline Lowland site.
R060AY018SD	**Dense Clay** The Dense Clay site will be located upslope of the Saline Lowland site.
R060AY026SD	**Saline Upland** The Saline Upland Site will be located upslope of the Saline Lowland site.
R060AY036SD	**Saline Subirrigated** The Saline Subirrigated site can be located adjacent to the Saline Lowland site.

Similar sites

R060AY026SD	**Saline Upland** The Saline Upland site will have very little cordgrass, if any, and lower production.
R060AY036SD	**Saline Subirrigated** The Saline Subirrigated site will have less wheatgrass and cordgrass, more alkali sacaton and grass-like species, and higher production.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Pascopyrum smithii* (2) *Spartina gracilis*

Physiographic features

This site normally occurs on nearly level to gently sloping uplands and river flood plains.

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 frequent
Ponding frequency	None
Elevation	762–1,311 m
Slope	0–6%
Ponding depth	0 cm
Water table depth	0–91 cm
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 (average)	115 days
Freeze-free period (average)	133 days
Precipitation total (average)	432 mm

Climate stations used

- (1) ARDMORE 1 NW [USC00390236], Edgemont, SD
- (2) BELLE FOURCHE [USC00390559], Belle Fourche, SD
- (3) WASTA [USC00398911], Owanka, SD
- (4) UPTON [USC00489205], Upton, WY
- (5) MOORCROFT 3S [USW00024088], Moorcroft, WY
- (6) REDBIRD [USC00487555], Lance Creek, WY

Influencing water features

Cowardin, et al., 1979

Soil features

The soils of this site are deep to very deep, poorly drained and formed in alluvium overlying clay shale, soft sandstone, or stratified alluvium. Layers of the soil most influential to the plant community vary from 3 to 6 inches thick. These soils have slow to very slow permeability and are moderately to strongly saline. Higher soluble salt concentrations may be found in the subsoil. The surface soil will be highly variable and vary from 2 to 8 inches in thickness. The surface texture is silty clay or silty clay loam. A fluctuating water table occurs in these areas and

ranges from 1 to 3 feet. The water table is within reach of plants during most of the growing season. These areas are subject to occasional overflow. This site should show slight to moderate evidence of rills, wind-scoured areas, and/or pedestalled plants. Water flow paths are somewhat continuous, but irregular in appearance with few debris dams, or vegetative barriers.

Soils correlated to the Saline Lowland ecological site include: Higgins, Haverdad, Kishona, Lohmiller, Sage, and Tripp.

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

Table 4. Representative soil features

Surface texture	(1) Silty clay loam (2) Silty clay
Family particle size	(1) Clayey
Drainage class	Poorly drained to somewhat poorly drained
Permeability class	Very slow to slow
Soil depth	102–203 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	2.54–15.75 cm
Calcium carbonate equivalent (0-101.6cm)	0–10%
Electrical conductivity (0-101.6cm)	4–16 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	5–13
Soil reaction (1:1 water) (0-101.6cm)	6.6–9
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

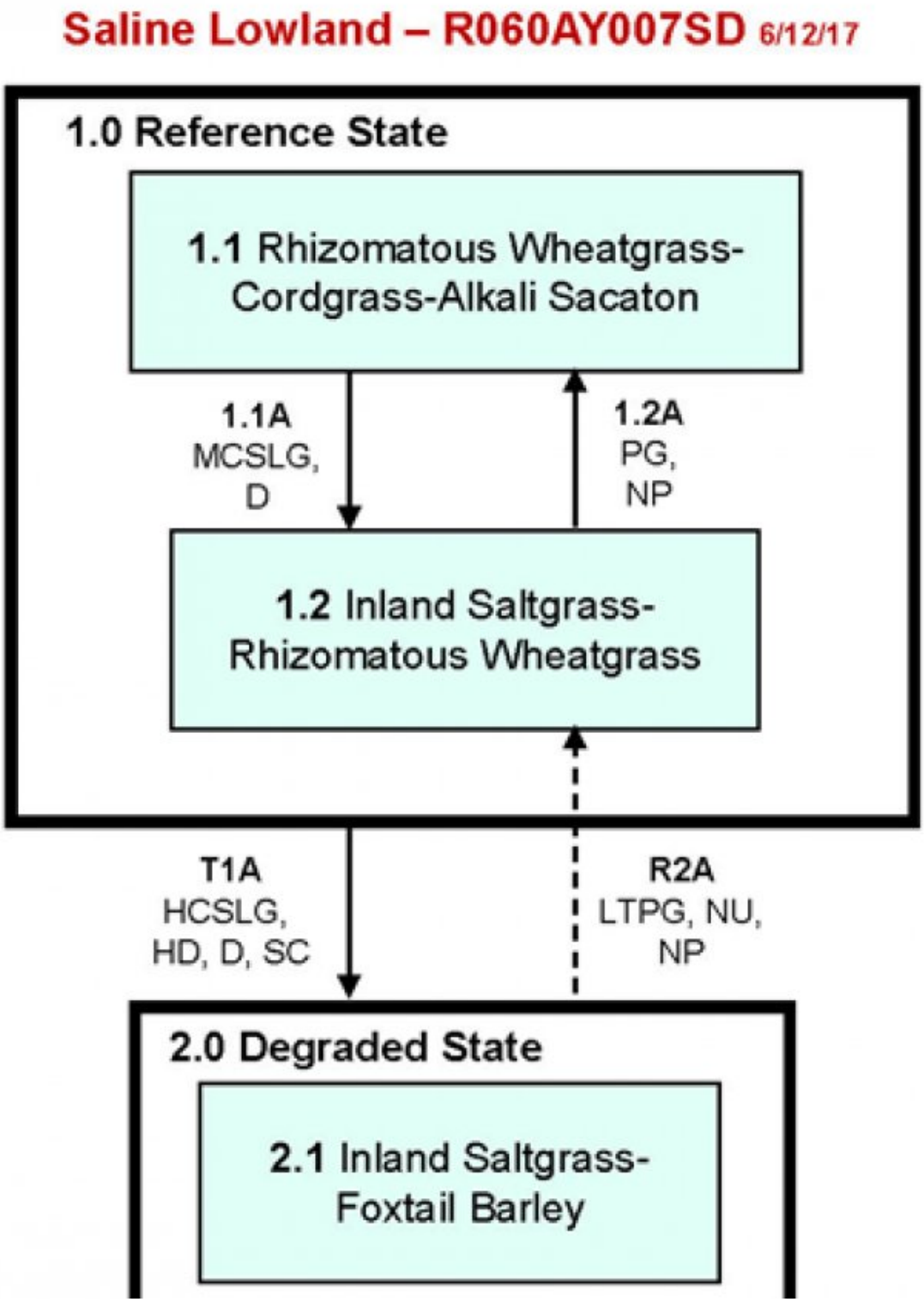
This site developed under Northern Great Plains climatic conditions, natural influences of large herbivores, occasional fire, and other biotic and abiotic factors that typically influence soil/site development. Changes will occur in the plant communities due to short-term weather variations, impacts of native and/or exotic plant and animal species, and management actions. While the following plant community descriptions 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, and annual species may invade the site. Grasses such as alkali sacaton, rhizomatous wheatgrasses, Nuttall's alkaligrass, and prairie cordgrass will decrease in frequency and production. Shrubs such as greasewood and rubber rabbitbrush will occur in higher amounts in the western portions of the MLRA and will also increase as the site deteriorates. 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.

The plant community upon which interpretations are primarily based is the Reference Plant Community Phase (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



D - Drought
HCSLG – Heavy, continuous season-long grazing
HD – Heavy disturbance
LTPG – Long-term prescribed grazing
MCSLG – Moderate, continuous season-long grazing
NP – Return to normal precipitation patterns
NU – Non-use
PG – Prescribed grazing (proper stocking rates with adequate recovery periods during the growing season)
SC – Soil Compaction
------→ Recovery may not be fast or feasible

Figure 6. Saline Lowland - R060AY007SD

Diagram Legend - Saline Lowland - R060AY007SD		
T1A	Heavy, continuous, season-long grazing, without adequate recovery, heavy disturbance, or drought. Possible soil compaction.	
R2A	Long-term prescribed grazing with change in season of use and adequate recovery period, return to normal precipitation following drought. Long- or short-term rest (non-use) may be required. Recovery may not be fast and/or meet management goals.	
CP 1.1A	1.1 - 1.2	Moderate, continuous, season-long grazing without change in season of use or adequate recovery time, drought.
CP 1.2A	1.2 - 1.1	Prescribed grazing including change in season of use, proper stocking, and adequate time for rest and recovery, return to normal precipitation following drought.

Figure 7. Saline Lowland - R060AY007SD

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 and rubber rabbitbrush will also increase on the western side of the MLRA.

Community 1.1
Rhizomatous Wheatgrass-Prairie Cordgrass-Alkali Sacaton

Figure 8. Saline Lowland - R060AY007SD - PCP 1.1.

The plant community upon which interpretations are primarily based is the Rhizomatous Wheatgrass-Prairie Cordgrass-Alkali Sacaton Plant Community (1.1). This is also considered the Reference Plant Community. Potential vegetation is about 65 to 90 percent grasses or grass- like plants, 5 to 10 percent forbs, 5 to 20 percent shrubs, and 0 to 5 percent trees. Saline-tolerant grasses dominate the plant community. Major grasses include rhizomatous wheatgrasses, alkali sacaton, Nuttall's alkaligrass, alkali and/or prairie cordgrass, and inland saltgrass. Woody plants are greasewood, fourwing saltbush, Gardner's saltbush, rubber rabbitbrush, and plains cottonwood. Shrubs such as greasewood and rubber rabbitbrush will occur in higher amounts in the western portions of the MLRA. 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 site's potential. Plant litter is properly distributed with some movement offsite, 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	1468	1737	2090
Shrub/Vine	106	280	476
Forb	106	168	230
Tree	–	56	118
Total	**1680**	**2241**	**2914**

Figure 10. Plant community growth curve (percent production by month). SD6007, Pierre Shale Plains, cool season dominant, warm season subdominant. Cool season dominant, warm season subdominant, lowland..

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

Community 1.2
Inland Saltgrass-Rhizomatous Wheatgrass

This plant community occurs as a result of heavy, continuous, season-long grazing. Grasses comprise about 60 to 80 percent, forbs 10 to 20 percent, shrubs 5 to 20 percent, and there are 0 to 3 percent trees. Dominant grasses include inland saltgrass, western wheatgrass, alkali, and/or prairie cordgrass. Other secondary grasses and grass-like plants include blue grama and sedges. Forbs such as asters and saltwort may occur and non-native forbs such as cocklebur may invade this plant community. When compared to the Reference Plant Community (1.1), saltgrass has increased. Alkali sacaton, alkaligrass, and woody vegetation have been greatly diminished. In the western portions of the MLRA, greasewood and rubber rabbitbrush may increase and result in a slightly different plant community. The grasses and forbs will be similar in composition; however, a significant component of shrubs

(mainly greasewood) will also occur on this plant community.

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	499	875	1250
Shrub/Vine	56	155	252
Forb	118	185	252
Tree	–	18	39
Total	**673**	**1233**	**1793**

Figure 12. 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..

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

Pathway 1.1A
Community 1.1 to 1.2

Moderate, continuous, season-long grazing without change in season of use, or adequate recovery time, and/or drought will convert this plant community to the Inland Saltgrass-Rhizomatous Wheatgrass Plant Community (1.2).

Pathway 1.2A
Community 1.2 to 1.1

Prescribed grazing including change in season of use, proper stocking rates, adequate recovery periods, and/or return to normal precipitation patterns following drought will shift this plant community back to the Rhizomatous Wheatgrass-Cordgrass-Alkali Sacaton Plant Community (1.1).

State 2
Degraded 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

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	420	722	1020
Shrub/Vine	45	126	207
Forb	95	151	207
Tree	–	10	22
Total	**560**	**1009**	**1456**

Figure 14. 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..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	10	16	22	23	14	7	5	0	0

Transition T1A
State 1 to 2

Heavy, continuous, season-long grazing without adequate recovery time, heavy disturbance, drought, and soil compaction will transition this State (1.0) to the Disturbed State (2.0).

Restoration pathway R2A
State 2 to 1

Under long-term prescribed grazing, possibly including extended rest (non-use) periods and avoiding grazing when hoof action would contribute to additional soil compaction and sedimentation, this plant community could return to the Inland Saltgrass-Rhizomatous Wheatgrass Plant Community (1.2). Depending on the severity of compaction, sedimentation, and if adequate perennial plants exist, this change could take an extended period of time and may not meet management goals. A return to normal precipitation patterns following drought will accelerate recovery.

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**			448–897	
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	448–897	–
	western wheatgrass	PASM	*Pascopyrum smithii*	448–897	–
	Montana wheatgrass	ELAL7	*Elymus albicans*	112–224	–
2	**Cordgrass**			224–673	
	alkali cordgrass	SPGR	*Spartina gracilis*	224–673	–
	prairie cordgrass	SPPE	*Spartina pectinata*	224–673	–
3	**Sacaton**			224–560	
	alkali sacaton	SPAI	*Sporobolus airoides*	224–560	–
4	**Other Grasses and Grass-likes**			224–448	
	Nuttall's alkaligrass	PUNU2	*Puccinellia nuttalliana*	224–448	–
	saltgrass	DISP	*Distichlis spicata*	112–336	–
	squirreltail	ELEL5	*Elymus elymoides*	0–112	–
	spikerush	ELEOC	*Eleocharis*	0–112	–
	slender wheatgrass	ELTRT	*Elymus trachycaulus ssp. trachycaulus*	0–112	–
	foxtail barley	HOJU	*Hordeum jubatum*	0–112	–
	rush	JUNCU	*Juncus*	0–112	–
	Sandberg bluegrass	POSE	*Poa secunda*	45–112	–
	bulrush	SCHOE6	*Schoenoplectus*	0–112	–
	sedge	CAREX	*Carex*	22–112	–
Forb					
6	**Forbs**			112–224	
	aster	ASTER	*Aster*	0–112	–
	Carelessweed	CYXA2	*Cyclachaena xanthiifolia*	0–112	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	0–112	–
	annual marsh elder	IVAN2	*Iva annua*	0–112	–
	povertyweed	IVAX	*Iva axillaris*	0–112	–
	red swampfire	SARU	*Salicornia rubra*	0–112	–
	Pursh seepweed	SUCA2	*Suaeda calceoliformis*	0–112	–
Shrub/Vine					
7	**Shrubs**			112–448	
	fourwing saltbush	ATCA2	*Atriplex canescens*	0–224	–
	Gardner's saltbush	ATGA	*Atriplex gardneri*	0–224	–
	greasewood	SAVE4	*Sarcobatus vermiculatus*	0–224	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–112	–
	Subshrub (<.5m)	2SUBS	*Subshrub (<.5m)*	0–112	–
Tree					
8	**Trees**			0–112	
	plains cottonwood	PODEM	*Populus deltoides ssp. monilifera*	0–112	–

Table 9. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Rhizomatous Wheatgrasses**			185–370	
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	185–370	–
	western wheatgrass	PASM	*Pascopyrum smithii*	185–370	–
	Montana wheatgrass	ELAL7	*Elymus albicans*	25–99	–
2	**Cordgrass**			62–185	
	alkali cordgrass	SPGR	*Spartina gracilis*	62–185	–
	prairie cordgrass	SPPE	*Spartina pectinata*	62–185	–
3	**Sacaton**			0–62	
	alkali sacaton	SPAI	*Sporobolus airoides*	0–62	–
4	**Other Grasses and Grass-likes**			308–493	
	saltgrass	DISP	*Distichlis spicata*	247–370	–
	foxtail barley	HOJU	*Hordeum jubatum*	62–123	–
	rush	JUNCU	*Juncus*	0–99	–
	Sandberg bluegrass	POSE	*Poa secunda*	37–99	–
	bulrush	SCHOE6	*Schoenoplectus*	0–62	–
	squirreltail	ELEL5	*Elymus elymoides*	0–62	–
	sedge	CAREX	*Carex*	12–62	–
	spikerush	ELEOC	*Eleocharis*	0–37	–
5	**Non-Native Grasses**			0–62	
	cheatgrass	BRTE	*Bromus tectorum*	0–62	–
Forb					
6	**Forbs**			123–247	
	Carelessweed	CYXA2	*Cyclachaena xanthiifolia*	0–99	–
	red swampfire	SARU	*Salicornia rubra*	25–99	–
	Pursh seepweed	SUCA2	*Suaeda calceoliformis*	0–86	–
	annual marsh elder	IVAN2	*Iva annua*	0–86	–
	povertyweed	IVAX	*Iva axillaris*	0–86	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	0–62	–
	Forb, annual	2FA	*Forb, annual*	0–62	–
	Forb, perennial	2FP	*Forb, perennial*	0–62	–
	aster	ASTER	*Aster*	0–62	–
	cocklebur	XANTH2	*Xanthium*	0–49	–
	Russian thistle	SALSO	*Salsola*	0–37	–
Shrub/Vine					
7	**Shrubs**			62–247	
	greasewood	SAVE4	*Sarcobatus vermiculatus*	0–185	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–123	–
	Subshrub (<.5m)	2SUBS	*Subshrub (<.5m)*	0–62	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	0–25	–

	Gardner's saltbush	ATGA	*Atriplex gardneri*	0–25	–
Tree					
8	**Trees**			0–37	
	plains cottonwood	PODEM	*Populus deltoides ssp. monilifera*	0–37	–

Table 10. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Rhizomatous Wheatgrasses**			0–101	
	western wheatgrass	PASM	*Pascopyrum smithii*	0–101	–
	Montana wheatgrass	ELAL7	*Elymus albicans*	–	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	–	–
4	**Other Grasses and Grass-likes**			404–706	
	saltgrass	DISP	*Distichlis spicata*	303–504	–
	foxtail barley	HOJU	*Hordeum jubatum*	101–202	–
	rush	JUNCU	*Juncus*	20–101	–
	Sandberg bluegrass	POSE	*Poa secunda*	50–101	–
	bulrush	SCHOE6	*Schoenoplectus*	0–50	–
	sedge	CAREX	*Carex*	10–50	–
	squirreltail	ELEL5	*Elymus elymoides*	0–50	–
5	**Non-Native Grasses**			20–81	
	cheatgrass	BRTE	*Bromus tectorum*	20–81	–
Forb					
6	**Forbs**			101–202	
	red swampfire	SARU	*Salicornia rubra*	30–101	–
	Pursh seepweed	SUCA2	*Suaeda calceoliformis*	0–101	–
	annual marsh elder	IVAN2	*Iva annua*	0–81	–
	povertyweed	IVAX	*Iva axillaris*	0–81	–
	Russian thistle	SALSO	*Salsola*	0–50	–
	cocklebur	XANTH2	*Xanthium*	0–50	–
	Carelessweed	CYXA2	*Cyclachaena xanthiifolia*	0–50	–
	aster	ASTER	*Aster*	0–40	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	0–30	–
	Forb, annual	2FA	*Forb, annual*	0–30	–
	Forb, perennial	2FP	*Forb, perennial*	0–30	–
Shrub/Vine					
7	**Shrubs**			50–202	
	greasewood	SAVE4	*Sarcobatus vermiculatus*	0–151	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–101	–
	Subshrub (<.5m)	2SUBS	*Subshrub (<.5m)*	0–50	–
Tree					
8	**Trees**			0–20	
	plains cottonwood	PODEM	*Populus deltoides ssp. monilifera*	0–20	–

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 = Rhizomatous Wheatgrass-Prairie Cordgrass-Alkali Sacaton (1.1)
Average Annual Production (lbs./ac, air-dry) = 2000
Stocking Rate (AUM/ac) = 0.55

Plant Community = Inland Saltgrass-Rhizomatous Wheatgrass (1.2)
Average Annual Production (lbs./ac, air-dry) = 1100
Stocking Rate (AUM/ac) = 0.30

Plant Community = Inland Saltgrass (2.1)
Average Annual Production (lbs./ac, air-dry) = 900
Stocking Rate (AUM/ac) = 0.25

*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 forage production on this site. This site is dominated by soils in hydrologic group D. Infiltration ranges from low to very low. Runoff potential for this site varies from moderate to high depending on slope and ground cover. In many cases, areas with greater than 75 percent ground cover have the greatest potential for high infiltration and lower runoff. An example of an exception would be where short grasses form a strong 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 varieties 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; Cheryl Nielsen, Range Management Specialist, NRCS; Rick Peterson, Range Management Specialist, NRCS; and Mike Stirling, Range Management Specialist, NRCS.

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Contributors

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Acknowledgments

ESD updated by Rick L. Peterson 6/12/17

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	Stan Boltz
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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

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

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 0 to 10 percent is typical.

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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 greater than 3. 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 dissolve in less than 1 minute.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** A-horizon should be 3 to 19 inches thick with dark grayish brown colors when moist. Structure typically is coarse sub-angular blocky in the 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 – when dry, B horizons can be hard and appear to be compacted, but no platy structure will be 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 cool-season rhizomatous grasses >

    Sub-dominant: Tall warm-season rhizomatous grasses > mid warm-season bunchgrasses > shrubs > mid cool-season bunchgrasses > short warm-season rhizomatous grasses >

    Other: Forbs = trees = grass-likes

    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.

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

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-**

production): Production ranges from 1,500-2,600 lbs./acre (air-dry weight). Reference value production is 2,000 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; 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.
