USDA Natural Resources
Conservation Service

Ecological site R060AY026SD
Saline Upland

Last updated: 6/25/2024
Accessed: 05/20/2025

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.

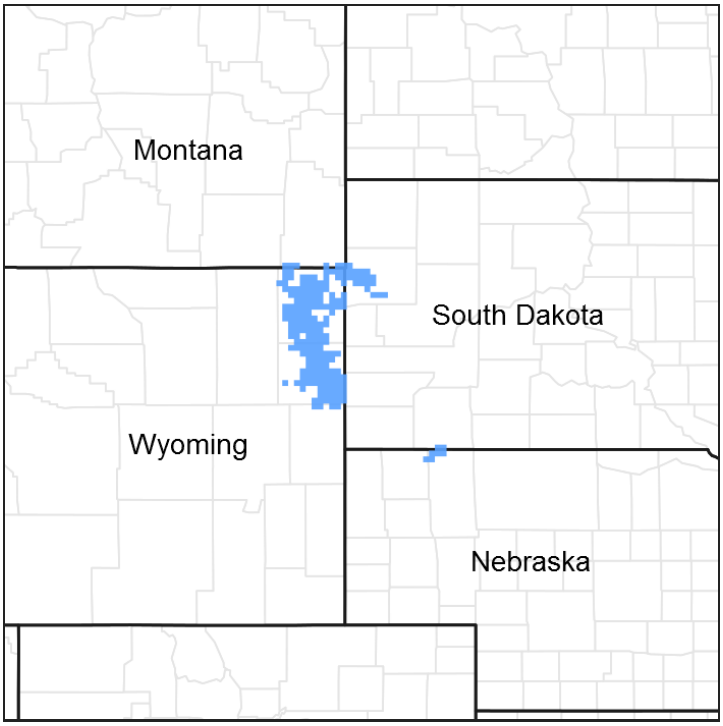


Figure 1. Mapped extent

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

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 Upland ecological sites occurs primarily in the western portion of the MLRA. It is located on gently rolling to steep uplands with slopes ranging from 0 to 45 percent. Soils are formed from materials weathered from highly saline shales. The soils are shallow with surface textures of clay, silt loam, or loam. Subsurface textures are typically silty clay with fragments of weathered shale and segregated salts.

Vegetation in the Reference State (1.0) consists primarily of rhizomatous wheatgrasses and Gardner’s saltbush. Prickly pear cactus is typically present in the plant community, but in minor amounts. Greasewood can also occur in small amounts throughout the site. Bare ground is common.

Associated sites

R060AY007SD	**Saline Lowland** The Saline Lowland site will occur lower on the landscape, typically in run-in sites.
R060AY016SD	**Very Shallow** The Very Shallow site will occur higher on the landscape with very shallow (< 10 inch soil depths).
R060AY017SD	**Shallow Clay** The Shallow Clay site can occur adjacent to the SU site, but soils will be shallow (< 20 inch soil depth), clayey, and have little, if any, salts.
R060AY018SD	**Dense Clay** The Dense Clay site can occur adjacent to the SU site with heavy clay soils and little or no salts.
R060AY024SD	**Shallow Loamy** The Shallow Loamy site can occur adjacent to the SU site, but soils will be shallow (< 20 inch soil depth), loamy, and have little, if any, salts.

Similar sites

R060AY007SD	**Saline Lowland** The Saline Lowland site has higher vegetative production, a higher water table, and cordgrass will be present.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Pascopyrum smithii* (2) *Elymus albicans*

Physiographic features

This site occurs on gently to steeply sloping uplands.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Plain
Flooding frequency	None
Ponding frequency	None
Elevation	2,500–4,300 ft

Slope	0–45%
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

Climate stations used

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

Influencing water features

No significant water features influence this site.

Wetland description

Not Applicable.

Soil features

The soils of this site consist of shallow, gently sloping to steep, well-drained, saline clayey soils on uplands. These soils formed in material weathered from highly saline shale. They contain fragments of shale and many spots of segregated salts. Below a depth of 14 inches is soft shale. These soils have low fertility and high salt content. They take in water very slowly and have very low available water capacity. Runoff is rapid. These soils are susceptible to wind and water erosion. This site typically should show slight evidence of rills, wind-scoured areas, and pedestalled plants. Water flow paths are broken, irregular in appearance, or discontinuous with numerous debris dams or vegetative barriers. The soil surface is moderately stable and intact. Sub-surface soil layers are moderately restrictive to water movement and root penetration.

Soils correlated to Saline Upland: Cadoma, Demar, Epsie, Orella and Topeman.

Demar is also correlated to Loamy and Claypan ecological sites in MLRA 60A. Orella is also correlated to the Shallow Clay and Topeman to Dense Clay. Further investigation is required to determine if these soils were accurately correlated to the Saline Upland site.

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 (2) Silty clay loam (3) Loam
Family particle size	(1) Clayey
Drainage class	Moderately well drained to well drained
Permeability class	Slow to very slow
Soil depth	10–80 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	1–5 in
Calcium carbonate equivalent (0-40in)	0–15%
Electrical conductivity (0-40in)	0–32 mmhos/cm
Sodium adsorption ratio (0-40in)	0–13
Soil reaction (1:1 water) (0-40in)	6.1–9.4
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.

The high salt content and hydrology properties greatly influence the vegetation of this site. This site tends to influence the vegetation of surrounding sites, but surrounding sites have little influence on it. Wheatgrasses and desirable shrubs such as Gardner’s saltbush and winterfat are the dominant species on this site. As it declines from mismanagement (over grazing or lack of recovery periods) species such as greasewood, woody aster, and

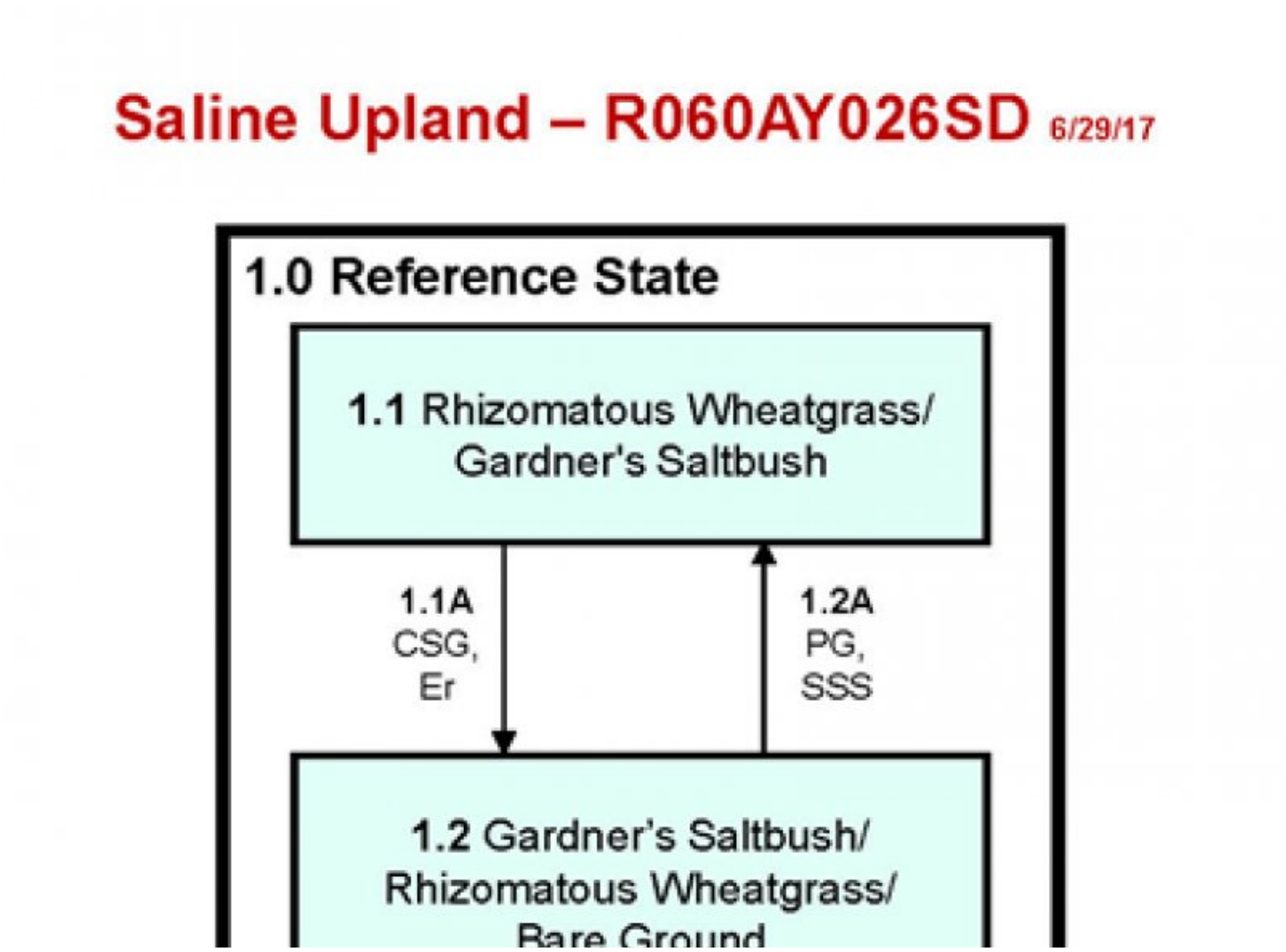
annuals will increase. The wheatgrasses and desirable shrubs such as saltbush and winterfat will decrease. Sweet clover tends to invade the site.

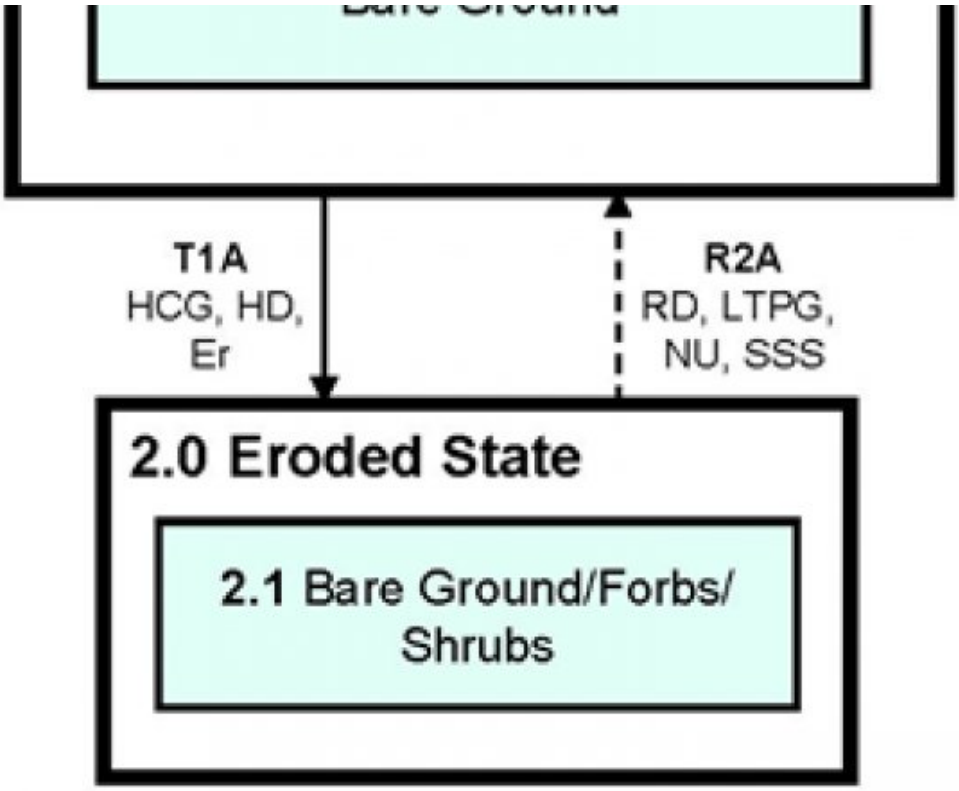
Historic, long-term use by sheep can reduce saltbush and winterfat dramatically, as these two species are preferred by sheep and some species of wildlife. A plant community on this this site with little or no saltbush rarely occurs in this MLRA.

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 diagram illustrates the common plant communities and vegetation states commonly occurring on the site and the transition pathways between communities and states. The ecological processes are discussed in more detail in the plant community descriptions following the diagram.

State and transition model





CSG – Continuous seasonal grazing without adequate recovery periods
Er – Erosion of soil surface
HCG – Heavy, continuous grazing without adequate recovery periods
HD – Heavy disturbance
LTPG – Long-term prescribed grazing, including adequate recovery opportunity and change in season of use
NU – No use
PG – Prescribed grazing with adequate recovery opportunity
RD – Removal of disturbance
SSS – Soil site stability
----→ Transition may not be rapid and/or achievable

Figure 8. Saline Upland - R060AY026SD

Diagram Legend - Saline Upland - R060AY026SD		
T1A	Heavy continuous grazing and/or heavy disturbance, resulting in erosion of the soil surface. Erosion can be natural and not management-induced.	
R2A	Removal of management-induced disturbance, long-term prescribed grazing with change in season of use and adequate recovery, and possibly extended periods of non-use. Recovery of soil/site stability. Transition may not be rapid and/or achievable.	
CP 1.1A	1.1 - 1.2	Continuous seasonal grazing without adequate recovery and increased soil erosion.
CP 1.2A	1.2 - 1.1	Prescribed grazing including change in season of use, proper stocking and adequate time for rest and recovery. Recovery of soil/site stability.

Figure 9. Saline Upland - R060AY026SD

State 1
Reference State

This state represents what is believed to represent the natural range of variability that dominated the dynamics in this ecological site prior to European settlement. This site is dominated by cool-season grasses and salt-tolerant shrubs. In pre-European times the primary disturbances include grazing by large ungulates and small mammals, and erosion. Favorable growing conditions occur during the spring and the warm months of June through August. This State can be found on areas having a history of proper grazing management, including adequate recovery periods between grazing events.

Community 1.1
Rhizomatous Wheatgrass/Gardner’s Saltbush

Figure 10. Saline Upland - R060AY026SD - PCP-1.1

The plant community upon which interpretations are primarily based is the Rhizomatous

Wheatgrass/Gardner’s Saltbush Plant Community (1.1). This is also considered the Reference Plant Community. Potential vegetation is about 45 to 70 percent grasses or grass-like plants, 2 to 10 percent forbs, and 25 to 45 percent shrubs. Rhizomatous wheatgrass and saline-tolerant shrubs such as Gardner’s saltbush dominate, along with winterfat. The major grasses are western wheatgrass, Montana wheatgrass, thickspike wheatgrass, and Sandberg bluegrass. Other grasses that may occur include bottlebrush squirreltail, inland saltgrass, alkali sacaton, and Indian ricegrass. This plant community can provide valuable winter grazing for wildlife and domestic livestock. The plant community is sensitive to management that reduces the vigor and abundance of the wheatgrasses and Gardner’s saltbush. These plants will generally not be replaced, and as the dominant plant community declines, bare ground will increase. This will cause the site to be more susceptible to soil erosion and the invasive forbs, such as sweet clover. Plant litter is properly distributed with some movement off-site. Natural plant mortality is low.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	245	354	435
Shrub/Vine	145	210	300
Forb	10	36	65
Total	**400**	**600**	**800**

Figure 12. Plant community growth curve (percent production by month). SD6002, Pierre Shale Plains, cool-season dominant, warm-season sub-dominant.. Cool-season dominant, warm-season sub-dominant..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	10	23	34	15	6	5	4	0	0

Community 1.2
Gardner’s Saltbush/Rhizomatous Wheatgrass/Bare Ground

Figure 13. Saline Upland - R060AY026SD - PCP 1.2

This plant community is developed under continuous seasonal grazing or short-term heavy grazing with inadequate recovery periods. The potential vegetation is made up of 15 to 40 percent grass and grass-like species, 5 to 15 percent forbs, and 45 to 65 percent shrubs. The dominant grasses are still the native wheatgrasses, but they comprise a lower percentage and exhibit lower vigor. The forb community is similar to Reference Plant Community (1.1), but it will also include less desirable forbs such as gumweed and sweetclover. The shrub component is very similar to the Reference Plant Community (1.1) in total production; however, saltbush has declined in production while cactus, broom snakeweed, and greasewood have increased. The amount of bare ground and erosion has increased when compared to the Reference Plant Community.

Table 6. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	175	220	275
Grass/Grasslike	110	140	160
Forb	15	40	65
Total	**300**	**400**	**500**

Figure 15. Plant community growth curve (percent production by month). SD6002, Pierre Shale Plains, cool-season dominant, warm-season sub-dominant.. Cool-season dominant, warm-season sub-dominant..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	10	23	34	15	6	5	4	0	0

Pathway 1.1A

Community 1.1 to 1.2

Rhizomatous Wheatgrass/Gardner's Saltbush

Gardner's Saltbush/Rhizomatous Wheatgrass/Bare Ground

Continuous seasonal grazing and erosion will convert this plant community to the Gardner's Saltbush/Rhizomatous Wheatgrass/*Bare Ground* Plant Community (1.2).

Pathway 1.2A
Community 1.2 to 1.1

Gardner's Saltbush/Rhizomatous Wheatgrass/Bare Ground

Rhizomatous Wheatgrass/Gardner's Saltbush

Prescribed grazing, resulting in soil/site stability will convert this plant community to the Rhizomatous Wheatgrass/Gardner's Saltbush Plant Community (1.1).

State 2
Eroded State

The Saline Upland site, even in the Reference State (1.0), will have a substantial amount of bare ground. The Eroded State is a result of heavy disturbances or heavy defoliation which allows for excessive soil erosion. At this point the soil/site stability is lost and soil erosion will continue and the re-establishment of native vegetation will be very slow.

Community 2.1
Bare Ground/Forbs/Shrubs

This plant community typically occurs on heavily disturbed sites where species composition and production can be quite variable. Bare ground tends to be extensive. Greasewood, woody aster, and cheatgrass are major components of this plant community. Sparse saline-tolerant grasses make up the majority of the understory with the balance made up of annual cool-season grasses and miscellaneous forbs. Dominant grasses include Sandberg bluegrass and squirreltail. Other grasses that occur include upland sedges, prairie Junegrass, and wheatgrasses. Forbs commonly found in this plant community include hairy false goldenaster, curlycup gumweed, and scarlet globemallow.

Plains pricklypear, broom snakeweed, Gardner’s saltbush, and winterfat can also occur. Depending on precipitation and climatic factors, various invasive forbs, such as sweetclover, will dominate the site. This plant community is not well protected from excessive erosion. Grazing for wildlife and livestock has been reduced. The biotic integrity of this plant community is not intact. The amount of bare ground puts the watershed at risk.

Table 7. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Forb	35	81	130
Grass/Grasslike	70	94	115
Shrub/Vine	45	75	105
Total	**150**	**250**	**350**

Figure 17. Plant community growth curve (percent production by month). SD6003, Pierre Shale Plains, cool-season/warm-season co-dominant.. Cool-season, warm-season co-dominant.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	10	20	28	21	10	5	3	0	0

Transition T1A
State 1 to 2

Heavy continuous grazing and/or heavy disturbance will result in an increase in bare ground and soil erosion, and a transition from the Reference State (1.0) to the Eroded State (2.0).

Restoration pathway R2A
State 2 to 1

This site may recover over time by removing the management induced disturbance, long-term prescribed grazing which allows for adequate recovery periods, or possibly extended periods of non-use. The site must regain soil/site stability in order to recover. This transition may not be rapid and/or achievable.

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Rhizomatous Wheatgrasses**			120–210	

1	**Rhizomatous Wheatgrasses**			120–210	
	Montana wheatgrass	ELAL7	*Elymus albicans*	120–210	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	120–210	–
	western wheatgrass	PASM	*Pascopyrum smithii*	120–210	–
2	**Native Grasses and Grass-likes**			30–120	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–60	–
	saltgrass	DISP	*Distichlis spicata*	5–60	–
	squirreltail	ELEL5	*Elymus elymoides*	12–60	–
	alkali sacaton	SPAI	*Sporobolus airoides*	6–60	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–30	–
	Sandberg bluegrass	POSE	*Poa secunda*	15–30	–
	blue grama	BOGR2	*Bouteloua gracilis*	0–30	–
	threadleaf sedge	CAFI	*Carex filifolia*	0–30	–
	Grass, perennial	2GP	*Grass, perennial*	0–30	–
Forb					
4	**Forbs**			12–60	
	milkvetch	ASTRA	*Astragalus*	6–30	–
	branched false goldenweed	OOMU	*Oonopsis multicaulis*	5–30	–
	beardtongue	PENST	*Penstemon*	0–18	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	0–18	–
	stemless four-nerve daisy	TEAC	*Tetraneuris acaulis*	0–18	–
	American vetch	VIAM	*Vicia americana*	0–18	–
	hawksbeard	CREPI	*Crepis*	0–18	–
	white prairie clover	DACA7	*Dalea candida*	0–18	–
	purple prairie clover	DAPU5	*Dalea purpurea*	0–18	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	0–18	–
	scarlet beeblossom	OESU3	*Oenothera suffrutescens*	0–18	–
	Forb, perennial	2FP	*Forb, perennial*	0–18	–
	onion	ALLIU	*Allium*	0–18	–
	aster	ASTER	*Aster*	0–18	–

Shrub/Vine					
5	**Shrubs**			150–270	
	Gardner's saltbush	ATGA	*Atriplex gardneri*	120–240	–
	greasewood	SAVE4	*Sarcobatus vermiculatus*	0–120	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	0–60	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–30	–
	Subshrub (<.5m)	2SUBS	*Subshrub (<.5m)*	0–30	–
	big sagebrush	ARTR2	*Artemisia tridentata*	0–30	–

Table 9. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Rhizomatous Wheatgrasses**			50–150	
	Montana wheatgrass	ELAL7	*Elymus albicans*	50–150	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	50–150	–
	western wheatgrass	PASM	*Pascopyrum smithii*	50–150	–
2	**Native Grasses and Grass-likes**			125–350	
	saltgrass	DISP	*Distichlis spicata*	5–40	–
	Sandberg bluegrass	POSE	*Poa secunda*	10–40	–
	squirreltail	ELEL5	*Elymus elymoides*	0–25	–
	Grass, perennial	2GP	*Grass, perennial*	0–25	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	0–20	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–20	–
	blue grama	BOGR2	*Bouteloua gracilis*	0–20	–
	threadleaf sedge	CAFI	*Carex filifolia*	0–20	–
	alkali sacaton	SPAI	*Sporobolus airoides*	0–15	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–15	–
Forb					
4	**Forbs**			25–75	
	sweetclover	MELIL	*Melilotus*	0–75	–

	milkvetch	ASTRA	*Astragalus*	5–50	–
	Forb, perennial	2FP	*Forb, perennial*	0–25	–
	curlycup gumweed	GRSQ	*Grindelia squarrosa*	0–25	–
	aster	ASTER	*Aster*	5–25	–
	branched false goldenweed	OOMU	*Oonopsis multicaulis*	4–20	–
	beardtongue	PENST	*Penstemon*	0–15	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	0–15	–
	stemless four-nerve daisy	TEAC	*Tetraneuris acaulis*	0–15	–
	American vetch	VIAM	*Vicia americana*	0–15	–
	hairy false goldenaster	HEVI4	*Heterotheca villosa*	0–15	–
	onion	ALLIU	*Allium*	0–15	–
	hawksbeard	CREPI	*Crepis*	0–15	–
	white prairie clover	DACA7	*Dalea candida*	0–15	–
	purple prairie clover	DAPU5	*Dalea purpurea*	0–15	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	0–15	–
	scarlet beeblossom	OESU3	*Oenothera suffrutescens*	0–15	–
Shrub/Vine					
5	**Shrubs**			180–260	
	Gardner's saltbush	ATGA	*Atriplex gardneri*	160–220	–
	greasewood	SAVE4	*Sarcobatus vermiculatus*	20–140	–
	pricklypear	OPUNT	*Opuntia*	5–50	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	5–50	–
	big sagebrush	ARTR2	*Artemisia tridentata*	0–40	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	0–35	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–15	–
	Subshrub (<.5m)	2SUBS	*Subshrub (<.5m)*	0–15	–

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/Gardner's Saltbush (1.1)
Average Annual Production (lbs./ac, air-dry) = 600
Stocking Rate (AUM/ac) = 0.16

Plant Community = Gardner's Saltbush/Rhizomatous Wheatgrass/*Bare Ground* (1.2)
Average Annual Production (lbs./ac, air-dry) = 400
Stocking Rate (AUM/ac) = 0.11

Plant Community = *Bare Ground*/Forb/Shrubs (2.1)
Average Annual Production (lbs./ac, air-dry) = Highly variable

*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 and salinity are the principal factors limiting forage production on this site. This site is dominated by soils in hydrologic group D. Infiltration ranges from slow to moderate. Runoff potential for this site varies from high to very 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 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 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 was also used. Those involved in developing this site description include: Everet Bainter, Range Management Specialist, NRCS; Stan Boltz, Range Management Specialist, NRCS; Brandon Brazee, Range Management Specialist, NRCS; Darrel DuVall, Range Management Specialist, NRCS; Jill Epley, Range Management Specialist, NRCS; Mitch Faulkner, Range Management Specialist, NRCS; Glen Mitchell, 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

Stan C. Boltz
Rick L. Peterson

Approval

Suzanne Mayne-Kinney, 6/25/2024

Acknowledgments

The ESD was updated on 7/5/17.

MLRA 60A Provisional Level Quality Control (QC) Process 9/28/17

Ecological Site from MLRA 60A were Previously Approved ESDs and meet the requirements as stated in the 2003 National Range and Pasture Handbook.

The Sites were updated to the Provisional Level by Rick L. Peterson, ESS, Rapid City, SSO in FY17.

The sites were reviewed by George Gamblin, RMS, Wheatland, WY and Mitch Faulkner, RMS, Belle Fourche, SD. Mitch Faulkner acted as the Provisional QC. The Sites were then reviewed and approved at the Provisional Level by David Kraft, Regional ESS, Salina, KS. Worked closely with Kent Cooley, Area SS, with MLRA key development and soils narratives

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, Ryan Beer, Mitch Iverson, Thad Berrett, Cheryl Nielsen
Contact for lead author	stanley.boltz@sd.usda.gov, 605-352-1236
Date	06/04/2008
Approved by	Suzanne Mayne-Kinney
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills are common on this site, and are connected, beginning formation of small gullies.

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2. **Presence of water flow patterns:** Normally broken and irregular becoming continuous on steeper slopes with numerous debris dams.

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3. **Number and height of erosional pedestals or terracettes:** Pedestals are somewhat common, but no exposed roots should be present.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 10 to 35 percent is typical on slopes less than 25% (those areas not in association with shale outcropping); 15 to 50 percent on steeper slopes when in association with shale outcropping.

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5. **Number of gullies and erosion associated with gullies:** Some gullies may appear in concentrated flow/drainage areas on steeper slopes or on lower slopes where runoff exits the slope. Gullies are typically short (5 feet long or less) and typically about 6-12 inches deep.

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

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7. **Amount of litter movement (describe size and distance expected to travel):** Moderate amount of movement of smallest size class litter, slight to moderate movement of medium and sometimes large class litter is possible.

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil aggregate stability ratings should typically be 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.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** A-horizon should be 2 to 4 inches thick with light olive gray colors when moist. Structure should typically be platy parting to fine granular in the A-horizon.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Combination of shallow and deep rooted species (mid & tall rhizomatous and tufted perennial cool- and warm-season grasses) with fine and coarse roots positively influences infiltration.

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

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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: Shrubs >

    Sub-dominant: Rhizomatous wheatgrasses > short warm-season grasses > mid warm-season bunchgrasses > short cool-season bunchgrasses >

Other: Forbs

Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Very little evidence of decadence or mortality. Bunch grasses have strong, healthy centers and shrubs are vigorous.

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

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Production ranges from 400-800 lbs./acre (air-dry weight). Reference value production is 600 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

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