

Ecological site R102AY007SD Saline Lowland

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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.

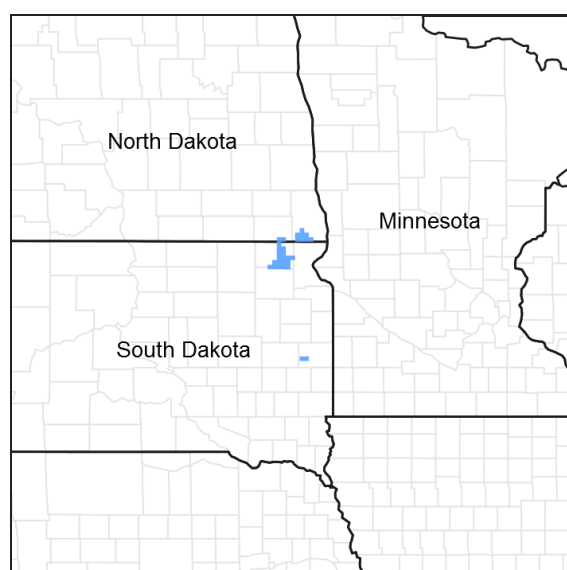


Figure 1. Mapped extent

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): 102A—Rolling Till Prairie

The Rolling Till Prairie (102A) is located within the Central Feed Grains and Livestock Land Resource Region. It spans 3 states (Minnesota 58 percent, South Dakota 42 percent, and small part in North Dakota), encompassing over 16,000 square miles (Figure 1). The elevation ranges from approximately over 2,000 feet above sea level (ASL) on the Prairie Coteau in Northeastern South Dakota to about 1,000 feet ASL on lowlands. The dominate landform in this area are stagnation moraines, end moraines, glacial outwash plains, terraces, and flood plains. The area is dominated by till covered moraines. The stagnation moraines are gently undulating to steep and have many depressions and poorly defined drainages. Small outwash areas are adjacent to the watercourses. The Cretaceous Pierre Shale underlies the till in the most of the area. Precambrian rocks also occur at depth. Granite is quarried near Milbank, South Dakota and outcrops of Sioux Quartzite are common. (USDA-NRCS 2006).

The dominant soil order in this MLRA is Mollisols. The soils in the area dominantly have a frigid soil temperature regime, an aquic or udic soil moisture regime, and mixed mineralogy. They generally are very deep, well drained to very poorly drained. This area supports true prairie vegetation characterized by big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), porcupinegrass (*Hesperostipa spartea*), and green needlegrass (*Nassella viridula*). Prairie cordgrass (*Spartina pectinata*) commonly grows in wet areas. (USDA-NRCS 2006).

Classification relationships

Major Land Resource Area (MLRA): Rolling Till Prairie (102A) (USDA-NRCS 2006)

USFS Subregions: North Central Glaciated Plains Section (251B); Upper Minnesota River-Des Moines Lobe Subsection (251Ba); Outer Coteau des Prairies Subsection (251Bb); Northwest Iowa Plains Subsection (251Bd); Minnesota and Northeast Iowa Morainal-Oak Savannah Section (222M); Alexandria Moraine-Hardwood Hills Subsection (222Ma) (Cleland et al. 2007).

US EPA Level IV Ecoregion: Tewaukon/Big Stone Stagnation Moraine (46e), Prairie Coteau (46k), Prairie Coteau Escarpment (46l), Big Sioux Basin (46m), Minnesota River Prairie (46o), Des Moines Lobe (47b) , Lake Agassiz Plains (48d), Alexandria Moraines and Detroit Lakes Outwash Plain (51j) (USEPA 2013)

Ecological site concept

The Saline Lowland ecological site typically occurs in drainageways but can occur along the edges of larger closed depressions. Soils are poorly and very poorly drained which have a water table within 0 to 2 feet of the soil surface that persists longer than the wettest part of the growing season typically until the month of August. The soils will have visible salts within 16 inches of the soil surface. Dominant vegetation is adapted to high salinity and excessive wetness, which include species such as Prairie Cordgrass and Alkali cordgrass, Nuttall's alkaligrass, and switchgrass. Salt tolerant forbs present may include alkali plantain, western dock, and Pursh seepweed. The site may become degraded due to change in disturbance regime, and vegetation may shift to community dominated by foxtail barley, inland saltgrass, and bareground.

Associated sites

R102AY001SD	Shallow Marsh These sites occur in a basin or closed depression. Soils are very poorly drained and the site will pond water until early summer in most years. The central concept soil series is Parnell and Oldham, but other series are included.
R102AY002SD	Linear Meadow These sites occur in drainageways. Soils are poorly and very poorly drained which have a water table within 0 to 2 feet of the soil surface that persists longer than the wettest part of the growing season typically until the month of August. The central concept soil series are Vallery and Colvin, but other series are included.
R102AY004SD	Wet Meadow These sites occur in a basin or closed depression. Soils are poorly drained and the site ponds water for 4 to 8 weeks in the spring of the year or after a heavy rain. The central concept soil series is Tonka, but other series are included.
R102AY036SD	Saline Subirrigated These sites occur along the edges of drainageways or closed depressions. Soils are somewhat poorly drained which have a water table within 2 to 5 feet of the soil surface that persists longer than the wettest part of the growing season typically until the month of August. Soils will effervesce with acid at or near the surface and have visible salts within 16 inches of the soil surface. The central concept soil series is McKranz, moderately saline but other series could be included.

Similar sites

R102AY036SD	Saline Subirrigated The Saline Subirrigated site occurs along the edges of drainageways or closed depressions. Soils are somewhat poorly drained which have a water table within 2 to 5 feet of the soil surface that persists longer than the wettest part of the growing season typically until the month of August. Soils will effervesce with acid at or near the surface and have visible salts within 16 inches of the soil surface. A Saline Subirrigated site will have less prairie cordgrass, more big bluestem and Indiangrass than a Saline Lowland site.
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Table 1. Dominant plant species

Tree	Not specified
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Shrub	Not specified
Herbaceous	(1) <i>Spartina pectinata</i> (2) <i>Spartina gracilis</i>

Physiographic features

The Saline Lowland ecological site typically occurs in drainageways, but can occur along the edges of larger closed depressions.

Table 2. Representative physiographic features

Landforms	(1) Drainageway (2) Closed depression
Flooding duration	Long (7 to 30 days)
Flooding frequency	None to frequent
Ponding duration	Very long (more than 30 days)
Ponding frequency	None to frequent
Elevation	305–610 m
Slope	0–1%
Ponding depth	0–30 cm
Water table depth	0–61 cm
Aspect	Aspect is not a significant factor

Climatic features

MLRA 102A is considered to have a continental climate – cold winters and relatively hot summers, low to moderate 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 typically ranges from 21 to 27 inches per year. The average annual temperature is about 43°F. January is the coldest month with average temperatures ranging from about 5°F (Mahnomen 1 W, Minnesota (MN)), to about 14°F (Tracy, MN). July is the warmest month with temperatures averaging from about 69°F (Mahnomen 1 W, MN), to about 73°F (Tracy, MN). The range of normal average monthly temperatures between the coldest and warmest months is about 62°F. This large annual range attests to the continental nature of this area's climate. Hourly winds are estimated to average about 11 miles per hour (mph) annually, ranging from about 13 mph during the spring to about 10 mph 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 mph.

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. Greenup 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)	114-126 days
Freeze-free period (characteristic range)	138-144 days
Precipitation total (characteristic range)	584-635 mm
Frost-free period (actual range)	110-129 days
Freeze-free period (actual range)	131-149 days
Precipitation total (actual range)	559-660 mm
Frost-free period (average)	121 days

Freeze-free period (average)	141 days
Precipitation total (average)	610 mm

Climate stations used

- (1) ROY LAKE [USC00397326], Lake City, SD
- (2) MILBANK 4 NW [USC00395536], Milbank, SD
- (3) WEBSTER [USC00399004], Webster, SD
- (4) CLARK [USC00391739], Clark, SD
- (5) CASTLEWOOD [USC00391519], Castlewood, SD
- (6) BROOKINGS 2 NE [USC00391076], Brookings, SD
- (7) ARLINGTON 1 W [USC00390281], Arlington, SD
- (8) BROWNS VALLEY [USC00211063], Beardsley, MN
- (9) CLEAR LAKE [USC00391777], Clear Lake, SD
- (10) SISSETON [USC00397742], Sisseton, SD
- (11) SUMMIT 1 W [USC00398116], Summit, SD
- (12) WATERTOWN 1W [USC00398930], Watertown, SD

Influencing water features

Soil features

The Saline Lowland ecological site typically occurs in drainageways, but can occur along the edges of larger closed depressions. Soils are poorly and very poorly drained which have a water table within 0 to 2 feet of the soil surface that persists longer than the wettest part of the growing season typically until the month of August. The soils will have visible salts within 16 inches of the soil surface. The central concept soil series is Playmoor, but other series are included.

Table 4. Representative soil features

Surface texture	(1) Silty clay (2) Silty clay loam
Family particle size	(1) Clayey
Drainage class	Poorly drained
Permeability class	Very slow to slow
Soil depth	203 cm
Surface fragment cover <=3"	0–3%
Surface fragment cover >3"	0–1%
Available water capacity (0-101.6cm)	10.16–17.78 cm
Calcium carbonate equivalent (0-101.6cm)	5–30%
Electrical conductivity (0-101.6cm)	4–16 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–5
Soil reaction (1:1 water) (0-101.6cm)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–5%

Subsurface fragment volume >3" (Depth not specified)	0–2%
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Ecological dynamics

The site which is located in the Prairie Pothole Region developed under Northern Great Plains climatic conditions and included natural influence of large herding herbivores and occasional fire. Changes will occur in the plant communities due to weather fluctuations and/or management actions. Under adverse impacts, a relatively rapid decline in vegetative vigor and composition can occur. Under favorable conditions the site has the potential to resemble the Reference State. Interpretations for this site are based primarily on the 1.1 Prairie Cordgrass-Alkali Cordgrass-Nuttall's Alkaligrass Plant Community Phase. This community phase and the Reference State have 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 considered.

This ecological site (ES) has been grazed by domestic livestock since they have been introduced into the area. As this site deteriorates, species such as inland saltgrass (*Distichlis spicata*) and foxtail barley (*Hordeum jubatum*) increase and annual species may invade the site. Grasses such as alkali sacaton (*Sporobolus airoides*), Prairie Cordgrass, Alkali Cordgrass, and Nuttall's alkaligrass will decrease in frequency and production. The salinity 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.

Following the state and transition diagram are narratives for each of the described states and community phases. These may not represent every possibility, but they are the most prevalent and repeatable states/community phases. The plant composition tables shown below have been developed from the best available knowledge at the time of this revision. As more data are collected, some of these community phases and/or states may be revised or removed, and new ones may be added. The main purpose for including the descriptions here is to capture the current knowledge and experience at the time of this revision.

State and transition model

Saline Lowland– R102AY007SD

1 Reference State

1.1 Prairie Cordgrass-Alkali Cordgrass-Nuttall's Alkaligrass

1.1A
HCG

1.2A
PG

1.2 Western Wheatgrass-Foxtail Barley-Inland Saltgrass

T1
HCG, NF

R2
LTPG, PB

2 Degraded State

2.1 Foxtail Barley-
Inland Saltgrass/Bare Ground

2.1A
HCG

2.2A
T

2.2 Annual Pioneer-
Perennial Pioneer/Bare Ground

LEGEND

Saline Lowland – R102AY007SD

HCG – Heavy continuous grazing

LTPG – Long-term prescribed grazing

NF – No fire

PB – Prescribed burning

PG – Prescribed grazing

T – Time w/wo disturbances

Code	Process
T1	Heavy continuous grazing, no fire
1.1A	Heavy continuous grazing
1.2A	Prescribed grazing with recovery periods
2.1A	Heavy continuous grazing
2.2A	Time w/wo disturbances
R2	Long term prescribed grazing, prescribed burning

State 1

Reference State

This Reference State represents the natural range of variability that dominates the dynamics of this ES. This state is typically dominated by warm-season grass and grass-like species. Before European settlement, the primary disturbance mechanisms for this site in the reference condition included periodic fire, grazing by large herding ungulates, and fluctuations in the water table and ponding frequency and duration. Frequent surface fires (3 to 5 years) and grazing coupled with weather events dictated the dynamics that occurred within the natural range of variability. Today, the primary disturbance is from a lack of fire, concentrated livestock grazing, and weather fluctuations. Species that are desirable for livestock and wildlife can decline and a corresponding increase in less desirable species will occur.

Community 1.1

Prairie Cordgrass-Alkali Cordgrass-Nuttall's Alkaligrass

Interpretations are based primarily on the 1.1 Prairie Cordgrass-Alkali Cordgrass-Nuttall's Alkaligrass Plant Community Phase (this is also considered to be climax). This community evolved with grazing by large herbivores, occasional prairie fires, and periodic flooding events and can be found on areas that are properly managed with grazing and/or prescribed burning, and sometimes on areas receiving occasional short periods of rest. The potential vegetation is about 85 percent grasses and grass-like plants and 15 percent forbs. The major grasses include prairie cordgrass, alkali cordgrass, and Nuttall's alkaligrass. Other grass and grass-like species present include western wheatgrass (*Pascopyrum smithii*), slender wheatgrass (*Elymus trachycaulus*), inland saltgrass, switchgrass (*Panicum virgatum*), sedge (*Carex*), and foxtail barley. Salt tolerant forbs such as alkali plantain (*Plantago eripoda*), western dock (*Rumex aquaticus*), and Pursh seepweed (*Suaeda calceoliformis*) are common. Interpretations are based primarily on this plant community phase. This community phase is diverse, stable, productive, and well adapted to both saline soils and the Northern Great Plains climatic conditions. Community dynamics, nutrient cycle, water cycle, and energy flow are functioning properly. Litter is properly distributed with very little movement offsite and natural plant mortality is very low. This community is resistant to many disturbances except continuous grazing, tillage, and/or development into urban or other uses. The diversity in plant species allows for both the fluctuation of flooding, as well as, large variations in climate.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	3598	4439	5167
Forb	213	493	885
Total	3811	4932	6052

Figure 9. Plant community growth curve (percent production by month).
SD0208, Rolling Till Prairie, lowland cool-season/warm-season codominant..
Cool-season, warm-season codominant, 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

Community 1.2

Western Wheatgrass-Foxtail Barley-Inland Saltgrass

This community develops with heavy continuous grazing with lack of adequate recovery periods during the growing season, and/or annual, early spring seasonal grazing. Lack of litter and reduced plant heights result in higher soil temperatures, poor water infiltration rates, high evapotranspiration, and increased percolation of the high water table, which increases salt concentrations on the surface. This gives inland saltgrass and other salt tolerant species a competitive advantage over less tolerant species. Nuttall's alkaligrass, slender wheatgrass, prairie cordgrass, and alkali cordgrass have decreased while western wheatgrass and inland saltgrass will initially increase in composition. Alkali muhly (*Muhlenbergia asperifolia*), foxtail barley, silverleaf cinquefoil (*Potentilla argentea*), western dock, and alkali plantain will also increase in composition. As long as the herbaceous component remains intact, the plant community tends to be resilient. However, species composition can be further altered through long-term heavy continuous grazing. With loss of Nuttall's alkaligrass, Prairie cordgrass, Alkali Cordgrass, and much of the western wheatgrass, the inland saltgrass, and foxtail barley will eventually become the dominant species. This plant community is relatively stable and well adapted to increased salinity. Plant vigor, litter, plant density, and production have decreased. The biological integrity, water, and nutrient cycles of this plant community are becoming impaired.

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	2528	3236	3822
Forb	163	463	885
Total	2691	3699	4707

Figure 11. Plant community growth curve (percent production by month).
SD0207, Rolling Till Prairie, 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

Pathway 1.1A Community 1.1 to 1.2

Heavy continuous grazing which includes herbivory at moderate to heavy levels at the same time of year each year without adequate recovery periods, or during periods of below normal precipitation when grazing frequency and intensity increases on these sites due to limited forage availability on adjacent upland sites will shift this community to the 1.2 Western Wheatgrass-Foxtail Barley-Inland Saltgrass Plant Community Phase.

Pathway 1.2A Community 1.2 to 1.1

Prescribed Grazing (alternating season of use and providing adequate recovery periods) or periodic light to moderate grazing possibly including periodic rest will convert this plant community to the returned to normal disturbance regime levels and frequencies or periodic light to moderate grazing possibly including periodic rest would have converted this plant community to the 1.1 Prairie Cordgrass-Alkali Cordgrass-Nuttall's Alkaligrass Plant Community Phase.

Conservation practices

Prescribed Grazing

State 2 Degraded State

This State is characterized by the dominance of the shorter-statured, more saline tolerant species such as foxtail barley and inland saltgrass, the increase in bare ground, and the increased presence of salt accumulations on the soil surface. Infiltration is reduced, which allows the moisture and the salts carried by the moisture to be wicked up

to the soil surface. The short-statured and shallow rooted species are more capable of withstanding the higher concentrations of salts in the soil surface. As the disturbance level increases, plant density decreases even more, giving way to annual species and invasive perennial species, as well as, a further increase in bare ground.

Community 2.1

Foxtail Barley-Inland Saltgrass/Bare Ground

This plant community developed with heavy continuous season-long grazing where adequate recovery periods between grazing events were not allowed. Patches of inland saltgrass sod are typical and foxtail barley is well distributed throughout the community. Tall warm-season grasses are nearly absent, and slender wheatgrass and western wheatgrass have been greatly reduced and may persist in remnant amounts, reduced in vigor. Bare ground may develop in micro lows where salt concentrations are highest. A white salt crust may form on the soil surface. The forb component is comprised of salt tolerant species such as Pursh seepweed and silverleaf cinquefoil. This plant community is resistant to change due to the grazing tolerance of inland saltgrass and increased surface salts. A significant amount of production and diversity has been lost when compared to 1.1 Prairie Cordgrass-Alkali Cordgrass-Nuttall’s Alkaligrass Plant Community Phase. Loss of key warm-season grasses and increased bare ground has negatively impacted energy flow and nutrient cycling. Water infiltration is reduced significantly due to the shallow rooting depth of inland saltgrass and increased bare ground.

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1132	1973	2477
Forb	213	493	885
Total	1345	2466	3362

Figure 13. Plant community growth curve (percent production by month).
SD0208, Rolling Till Prairie, lowland cool-season/warm-season codominant..
Cool-season, warm-season codominant, 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

Community 2.2

Annual Pioneer-Perennial Pioneer/Bare Ground

This plant community developed under continuous heavy grazing or other excessive disturbances. The potential plant community is made up of approximately 40 to 80 percent grasses and grass-like species and 20 to 60 percent forbs. The species present in this phase are highly variable, but often include nonnative invasive and/or early seral species. Plant diversity is low (plant richness may be high, but areas are often dominated by a few species). The ecological processes are difficult to restore because of the loss of plant diversity and overall soil disturbance. Soil erosion is potentially very high because of the bare ground and shallow rooted herbaceous plant community. Water runoff will increase and infiltration will decrease due to animal related soil compaction and loss of root mass due to low plant diversity and vigor. This plant community will require significant economic inputs and time to move towards another plant community. This movement is highly variable in its succession. This is due to the loss of diversity (including the loss of the seed bank), within the existing plant community and the plant communities on adjacent sites.

Pathway 2.1A

Community 2.1 to 2.2

Heavy continuous grazing which includes herbivory at moderate to heavy levels at the same time of year each year without adequate recovery periods, or during periods of below normal precipitation when grazing frequency and intensity increases on these sites due to limited forage availability on adjacent upland sites will shift this community to the 2.2 Annual Pioneer-Perennial Pioneer/*Bare Ground* Plant Community Phase.

Pathway 2.2A
Community 2.2 to 2.1

This community pathway occurs with the passage of time as successional processes take place and perennial plants gradually begin to establish on the site again. This pathway will lead to the 2.1 Foxtail Barley-Inland Saltgrass/*Bare Ground* Plant Community Phase

Transition T1
State 1 to 2

No surface fire for extended periods of time (typically for 10 or more years) causing litter levels to become high enough to reduce native grass vigor, diversity, and density, and/or heavy continuous grazing will likely lead this 1.2 Western Wheatgrass-Foxtail Barley-Inland Saltgrass Plant Community Phase within the Reference State (State 1) over a threshold resulting in the Degraded State (State 2).

Restoration pathway R2
State 2 to 1

Long-term prescribed grazing (moderate stocking levels coupled with adequate recovery periods, or other grazing systems such as high-density, low-frequency intended to treat specific species dominance, or periodic light to moderate stocking levels possibly including periodic rest) coupled with prescribed burning may lead this Degraded State (State 2) over a threshold to the Reference State (State 1).

Conservation practices

Prescribed Grazing

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	Warm-season Grasses			740–2219	
	alkali cordgrass	SPGR	<i>Spartina gracilis</i>	247–1480	–
	prairie cordgrass	SPPE	<i>Spartina pectinata</i>	247–1480	–
	switchgrass	PAVI2	<i>Panicum virgatum</i>	0–493	–
2	Wheatgrass			493–986	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	247–740	–
	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	247–493	–
3	Cool-season Grasses			493–1233	
	Nuttall's alkaligrass	PUNU2	<i>Puccinellia nuttalliana</i>	493–1233	–
	foxtail barley	HOJU	<i>Hordeum jubatum</i>	49–247	–
	plains bluegrass	POAR3	<i>Poa arida</i>	49–247	–
4	Short Warm-season Grasses			148–493	
	saltgrass	DISP	<i>Distichlis spicata</i>	99–493	–
	scratchgrass	MUAS	<i>Muhlenbergia asperifolia</i>	49–148	–
5	Grass-likes			247–740	
	sedge	CAREX	<i>Carex</i>	99–493	–
	spikerush	ELEOC	<i>Eleocharis</i>	49–247	–
	rush	JUNCU	<i>Juncus</i>	49–247	–
	Grass-like (not a true grass)	2GL	<i>Grass-like (not a true grass)</i>	0–148	–
Forb					
6	Forbs			247–740	
	Forb, native	2FN	<i>Forb, native</i>	49–197	–
	aster	ASTER	<i>Aster</i>	49–148	–
	annual marsh elder	IVAN2	<i>Iva annua</i>	0–148	–
	povertyweed	IVAX	<i>Iva axillaris</i>	0–99	–
	Pursh seepweed	SUCA2	<i>Suaeda calceoliformis</i>	49–99	–
	redwool plantain	PLER	<i>Plantago eriopoda</i>	49–99	–
	silver cinquefoil	POAR8	<i>Potentilla argentea</i>	49–99	–
	western dock	RUAQ	<i>Rumex aquaticus</i>	49–99	–
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	49–99	–
	lambsquartars	CHAL7	<i>Chenopodium album</i>	49–99	–
	mealy goosefoot	CHIN2	<i>Chenopodium incanum</i>	49–99	–
	Flodman's thistle	CIFL	<i>Cirsium flodmanii</i>	0–99	–
	scouringrush horsetail	EQHY	<i>Equisetum hyemale</i>	0–49	–
	silverscale saltbush	ATAR2	<i>Atriplex argentea</i>	0–49	–
	red swampfire	SARU	<i>Salicornia rubra</i>	0–49	–
	rush skeletonplant	LYJU	<i>Lygodesmia juncea</i>	0–49	–

Table 9. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	Warm-season Grasses			0–370	
	alkali cordgrass	SPGR	<i>Spartina gracilis</i>	0–370	–
	prairie cordgrass	SPPE	<i>Spartina pectinata</i>	0–370	–
2	Wheatgrass			555–1110	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	370–925	–
	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	74–370	–
3	Cool-season Grasses			185–925	
	foxtail barley	HOJU	<i>Hordeum jubatum</i>	185–740	–
	Nuttall's alkaligrass	PUNU2	<i>Puccinellia nuttalliana</i>	0–370	–
	plains bluegrass	POAR3	<i>Poa arida</i>	37–185	–
4	Short Warm-season Grasses			185–740	
	saltgrass	DISP	<i>Distichlis spicata</i>	185–740	–
	scratchgrass	MUAS	<i>Muhlenbergia asperifolia</i>	37–222	–
5	Grass-likes			185–555	
	spikerush	ELEOC	<i>Eleocharis</i>	37–296	–
	sedge	CAREX	<i>Carex</i>	37–259	–
	rush	JUNCU	<i>Juncus</i>	37–185	–
	Grass-like (not a true grass)	2GL	<i>Grass-like (not a true grass)</i>	0–111	–
Forb					
6	Forbs			185–740	
	Forb, introduced	2FI	<i>Forb, introduced</i>	0–185	–
	Forb, native	2FN	<i>Forb, native</i>	37–185	–
	lambsquarters	CHAL7	<i>Chenopodium album</i>	37–111	–
	aster	ASTER	<i>Aster</i>	37–111	–
	Pursh seepweed	SUCA2	<i>Suaeda calceoliformis</i>	37–111	–
	cocklebur	XANTH2	<i>Xanthium</i>	0–74	–
	curly dock	RUCR	<i>Rumex crispus</i>	0–74	–
	burningbush	BASC5	<i>Bassia scoparia</i>	0–74	–
	scouringrush horsetail	EQHY	<i>Equisetum hyemale</i>	0–74	–
	povertyweed	IVAX	<i>Iva axillaris</i>	0–74	–
	prickly lettuce	LASE	<i>Lactuca serriola</i>	0–74	–
	redwool plantain	PLER	<i>Plantago eriopoda</i>	37–74	–
	mealy goosefoot	CHIN2	<i>Chenopodium incanum</i>	37–74	–
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	37–74	–
	redroot amaranth	AMRE	<i>Amaranthus retroflexus</i>	0–74	–
	Flodman's thistle	CIFL	<i>Cirsium flodmanii</i>	0–37	–
	silver cinquefoil	POAR8	<i>Potentilla argentea</i>	0–37	–
	western dock	RUAQ	<i>Rumex aquaticus</i>	0–37	–
	annual marsh elder	IVAN2	<i>Iva annua</i>	0–37	–
	silverscale saltbush	ATAR2	<i>Atriplex argentea</i>	0–37	–
	red swampfire	SARU	<i>Salicornia rubra</i>	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	Wheatgrass			0–247	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	0–247	–
2	Cool-season Grasses			370–1110	
	foxtail barley	HOJU	<i>Hordeum jubatum</i>	370–1110	–
	plains bluegrass	POAR3	<i>Poa arida</i>	0–123	–
	Nuttall's alkaligrass	PUNU2	<i>Puccinellia nuttalliana</i>	0–123	–
3	Short Warm-season Grasses			247–740	
	saltgrass	DISP	<i>Distichlis spicata</i>	247–740	–
	scratchgrass	MUAS	<i>Muhlenbergia asperifolia</i>	25–123	–
4	Grass-likes			25–123	
	spikerush	ELEOC	<i>Eleocharis</i>	25–123	–
	rush	JUNCU	<i>Juncus</i>	0–99	–
	sedge	CAREX	<i>Carex</i>	0–74	–
	Grass-like (not a true grass)	2GL	<i>Grass-like (not a true grass)</i>	0–49	–
Forb					
5	Forbs			247–740	
	burningbush	BASC5	<i>Bassia scoparia</i>	49–616	–
	Forb, introduced	2FI	<i>Forb, introduced</i>	0–247	–
	curly dock	RUCR	<i>Rumex crispus</i>	25–247	–
	cocklebur	XANTH2	<i>Xanthium</i>	0–247	–
	redroot amaranth	AMRE	<i>Amaranthus retroflexus</i>	0–197	–
	prickly lettuce	LASE	<i>Lactuca serriola</i>	0–123	–
	Pursh seepweed	SUCA2	<i>Suaeda calceoliformis</i>	25–123	–
	povertyweed	IVAX	<i>Iva axillaris</i>	0–74	–
	lambsquarters	CHAL7	<i>Chenopodium album</i>	25–74	–
	Forb, native	2FN	<i>Forb, native</i>	0–74	–
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	0–49	–
	aster	ASTER	<i>Aster</i>	0–49	–
	silverscale saltbush	ATAR2	<i>Atriplex argentea</i>	0–49	–
	mealy goosefoot	CHIN2	<i>Chenopodium incanum</i>	0–49	–
	red swampfire	SARU	<i>Salicornia rubra</i>	0–49	–

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 ES description). Because of this, 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.

Prairie Cordgrass/Alkali Cordgrass/Alkaligrass (1.1)
Average Annual Production (lbs./acre, air-dry): 4400
Stocking Rate* (AUM/acre): 1.21

Wheatgrass/Foxtail Barley/Inland Saltgrass (1.2)
Average Annual Production (lbs./acre, air-dry): 3300
Stocking Rate* (AUM/acre): 0.90

Foxtail Barley/Inland Saltgrass, *Bare Ground* (2.2)
Average Annual Production (lbs./acre, air-dry): 2200
Stocking Rate* (AUM/acre): 0.60

Annual/Pioneer, Non-Native Perennial, *Bare Ground* (2.2)
Average Annual Production (lbs./acre, air-dry): 1200
Stocking Rate* (AUM/acre): 0.33

*Based on 912 lbs./acre (air-dry weight) per Animal Unit Month (AUM), and on 25 percent harvest efficiency (refer to United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), National Range and Pasture Handbook).

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 groups C and D. Infiltration is typically slow to very slow and runoff potential for this site varies from negligible to low depending on soil hydrologic group, 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 shortgrasses form a strong sod and dominate the site. Dominance by inland saltgrass and/or foxtail barley will result in reduced infiltration and increased runoff. 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, hiking, photography, bird watching, and other opportunities. The wide varieties of plants that bloom from spring until fall have an esthetic value that appeals to visitors.

Wood products

No appreciable wood products are typically present on this site.

Other products

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

Inventory data references

There is no NRCS clipping data and other inventory currently available for this site. Information presented here has been derived using field observations from range-trained personnel. Those involved in developing this site include: Stan Boltz, Range Management Specialist, NRCS; and Bruce Kunze, Soil Scientist, NRCS.

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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)	David Schmidt, Tim Nordquist, Stan Boltz
Contact for lead author	
Date	12/04/2007
Approved by	Suzanne Mayne-Kinney
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills should not be present.

2. **Presence of water flow patterns:** Barely observable.

3. **Number and height of erosional pedestals or terracettes:** Essentially, non-existent.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground less than 5% and less than 2 inches in diameter.

5. **Number of gullies and erosion associated with gullies:** Active gullies should not be present.

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

7. **Amount of litter movement (describe size and distance expected to travel):** Little to no plant litter movement. Plant litter remains in place and is not moved by erosional forces.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Stability class typically 5-6. Typically high root content. Soil surface is very resistant to erosion.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Use soil series description for depth and color of A-horizon.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Healthy, deep rooted native grasses enhance infiltration and reduce runoff.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** No compaction layer should be evident.
-

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: Tall warm-season rhizomatous grass >> mid cool-season bunch grass

Sub-dominant: > mid cool-season rhizomatous grass = short warm-season grass = short cool-season grass = forb

Other:

Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Very little to no evidence of decadence or mortality.
-

14. **Average percent litter cover (%) and depth (in):** 85-90%, roughly 0.5 inch thick or less. Litter cover is in contact with soil surface.
-

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 3800 – 5000 lbs./acre air-dry weight, average 4,400 lbs./acre air-dry weight
-

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:** Refer to State and Local Noxious Weed List
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17. **Perennial plant reproductive capability:** All species are capable of reproducing.
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