USDA Natural Resources
Conservation Service

Ecological site R054XY022ND
Closed Depression

Accessed: 02/07/2025

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.

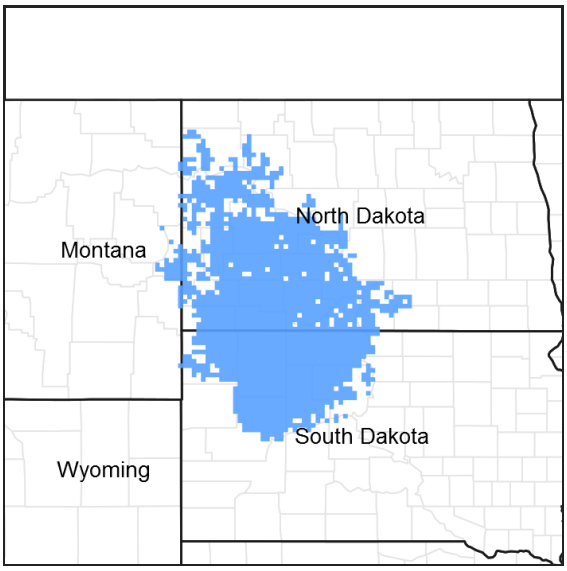


Figure 1. Mapped extent

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.

Classification relationships

Level IV Ecoregions of the Conterminous United States: 43a – Missouri Plateau.

Associated sites

R054XY020ND	**Clayey**
R054XY021ND	**Claypan**
R054XY033ND	**Thin Claypan**
R054XY036ND	**Shallow Marsh**

Similar sites

R054XY037ND	**Wet Meadow** [Poorly drained soils found adjacent to streams or in depressions, with water table at the surface or within 1.5 feet from the surface with no evidence of salts, noticeable redoximorphic features within 6 inches or just below the organic soil layer. Found upslope from wet land and downslope of subirrigated or overflow sites; can be located within the listed associated sites. Indicator species are prairie cordgrass, northern reedgrass and no shrub. This site has more production, far less western wheatgrass and far more prairie cordgrass, and a water table without a restrictive sodic layer or evidence of salts within the soil profile.]

R054XY033ND	**Thin Claypan** [Well drained soils on uplands or terraces that don't receive extra moisture with a dense sodic subsoil above 6 inches and with salts above 16 inches that restricts root penetration. Usually found in micro relief within Claypan sites, indicator species are western wheatgrass, Sandberg's bluegrass with an understory of blue grama and buffalograss, heath aster, cudweed sagewort and western yarrow along with a few shrubs of fringed sagewort, cactus and Nuttall's Saltbush. This site has blue grama but less western wheatgrass, far less production, different landscape position, no dock or smartweed, does have a sodic soil layer at similar depths but will not flood.]
R054XY024ND	**Saline Lowland** [Found adjacent to streams, toe slopes, foot slopes or sideslopes. Most are poorly drained soils, with water table at the surface or within 3 feet from the surface with evidence of salts within soil profile, noticeable redoximorphic features within 6 inches or just below the organic soil layer. Found upslope from wet land or wet meadow and downslope of subirrigated or overflow sites. Can be located within the listed associated sites. Indicator species are Nuttall's alkaligrass intermixed with western wheatgrass, some rushes and sedges. This site has similar species and production, less western wheatgrass, more prairie cordgrass, and a water table.]
R054XY021ND	**Claypan** [Well drained soils on uplands or terraces that don't receive extra moisture with a dense sodic subsoil below 6 inches with salts below 16 inches. Indicator species are western wheatgrass with an understory of blue grama, heath aster, and western yarrow along with a few shrubs of fringed sagewort and Nuttall's Saltbush. This site has green needlegrass, blue grama, less production, different landscape position, no dock or smart weed, does have a sodic soil layer, nor will flood.]
R054XY036ND	**Shallow Marsh** [Very poorly drained soils with noticeable redoximorphic features within 6 inches or just below the organic soil layer, found in depressions and along streams where water ponds at or above the surface for more the 7 days. Found down slope of wet meadow sites and can be in micro low positions within the listed associated sites. Indicator species are slough sedge, whitetop, prairie cordgrass, cattail, smartweed and no shrub. This site has similar landscape position, more production, no western wheatgrass and far more prairie cordgrass and slough sedge, no restrictive sodic layer or evidence of salts within the soil profile.]

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Pascopyrum smithii*

Physiographic features

This site occurs on level shallow lake basins and flat enclosed upland depressions.

Table 2. Representative physiographic features

Landforms	(1) Depression
Flooding frequency	None
Ponding duration	Long (7 to 30 days) to very long (more than 30 days)
Ponding frequency	Occasional to frequent
Elevation	1,600–3,600 ft
Slope	0–1%
Ponding depth	0–1 in
Water table depth	0–72 in
Aspect	Aspect is not a significant factor

Climatic features

MLRA 54 is considered to have a continental climate – cold winters and hot summers, low humidity, light rainfall,

and much sunshine. Extremes in temperature are characteristic. The climate is the result of this MLRA's location in the geographic center of North America. There are few natural barriers on the northern Great Plains. The air masses move unobstructed across the plains and account for rapid changes in temperature.

Annual precipitation ranges from 14 to 18 inches per year. The normal average annual temperature is about 42° F. January is the coldest month with average temperatures ranging from about 13° F (Beach, ND) to about 16° F (Bison, SD). July is the warmest month with temperatures averaging from about 69° F (Beach, ND) to about 72° F (Timber Lake, SD). The range of normal average monthly temperatures between the coldest and warmest months is about 57° F. This large annual range attests to the continental nature of this MLRA's climate. 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 are generally stronger than nighttime and occasional strong storms may bring brief periods of high winds with gusts to more than 50 miles per hour.

Growth of native cool-season plants begins in late March and continues to early to mid July. Native warm-season plants begin growth in mid May and continue to the end of August. Green up of cool-season plants can occur in September and October when adequate soil moisture is present.

Table 3. Representative climatic features

Frost-free period (average)	136 days
Freeze-free period (average)	157 days
Precipitation total (average)	18 in

Influencing water features

No significant water features influence this site.

Soil features

The common features of soils in this site are the silty clay to clay textured subsoil and slopes of 0 to 1 percent. The soils in this site are poorly drained and formed in alluvium. The silt loam to silty clay surface layer is 1 to 6 inches thick. The extremely hard clayey Btn horizon has a round-topped or bun shaped columnar structure. These Btn horizons are high in sodium. The soils have a moderately slow to very slow infiltration rate. Available water capacity is 1 to 6 inches. The soils crack when dry and heavy traffic can cause surface compaction when wet. Sub-surface soil layers are restrictive to water movement and root penetration. This site should show slight to no evidence of rills, wind scoured areas or pedestalled plants. Water flow paths are broken, irregular in appearance or discontinuous with numerous debris dams or vegetative barriers. The soil surface is stable and intact.

These soils are not susceptible to water erosion. Low available water capacity coupled with high accumulations of sodium and slow permeability strongly influences the soil-water-plant relationship.

Major soil series correlated to this ecological site can be found in Section II of the Natural Resources Conservation Service Field Office Technical Guide or the following web sites:
North Dakota http://www.nd.nrcs.usda.gov/
South Dakota http://www.sd.nrcs.usda.gov/
Montana http://www.mt.nrcs.usda.gov/

Table 4. Representative soil features

Surface texture	(1) Silt loam (2) Silty clay loam (3) Silty clay
Family particle size	(1) Clayey
Drainage class	Poorly drained
Permeability class	Very slow to slow

Soil depth	6–12 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	1–6 in
Calcium carbonate equivalent (0-40in)	0–15%
Electrical conductivity (0-40in)	0–16 mmhos/cm
Sodium adsorption ratio (0-40in)	2–25
Soil reaction (1:1 water) (0-40in)	5.6–9
Subsurface fragment volume <=3" (Depth not specified)	0–10%
Subsurface fragment volume >3" (Depth not specified)	0–1%

Ecological dynamics

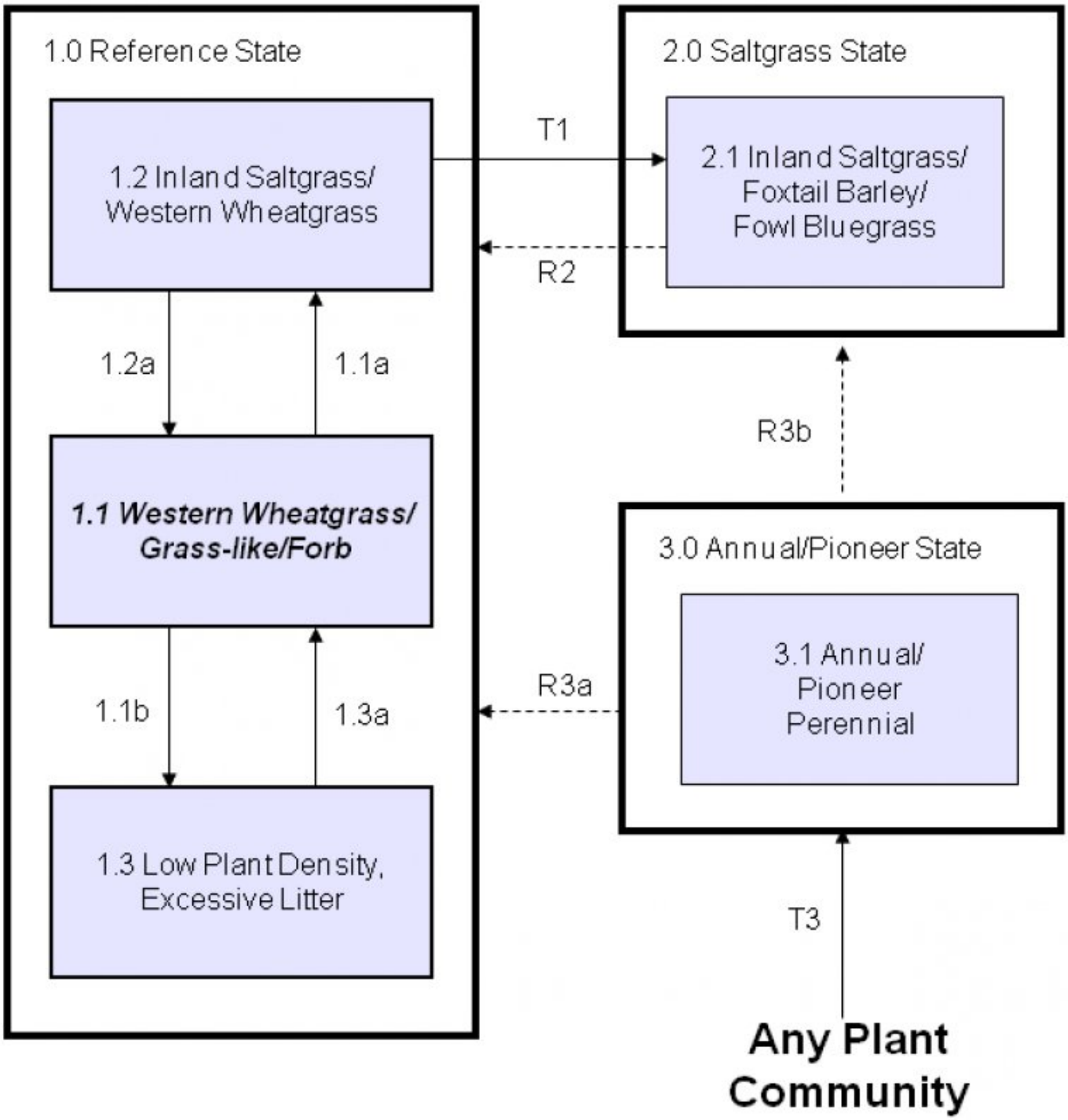
The site developed under Northern Great Plains climatic conditions, and included natural influence of large herbivores, periodic flooding events and occasional fire. Changes will occur in the plant communities due to climatic conditions and/or management actions. Due to the nature of the soils, the site is considered moderately resilient. Under continued adverse impacts, a moderate decline in vegetative vigor and composition will occur. Under favorable vegetative management treatments the site can more readily return to the Reference Plant Community.

The plant community upon which interpretations are primarily based is the Reference Plant Community. The Reference Plant Community has been determined by study of rangeland relic areas, areas protected from excessive disturbance, and areas under long-term rotational grazing regimes. Trends in plant community dynamics ranging from heavily grazed to lightly grazed areas, seasonal use pastures, and historical accounts also have been used. Subclimax plant communities, states, transitional pathways, and thresholds have been determined through similar studies and experience.

Heavy continuous grazing and/or continuous seasonal (spring) grazing, without adequate recovery periods following each grazing occurrence causes this site to depart from the Reference Plant Community. Inland saltgrass will begin to increase. Western wheatgrass will increase initially and then begin to decrease. In time, heavy continuous grazing will cause inland saltgrass, foxtail barley, fowl bluegrass, other pioneer perennials and annuals to increase. Extended periods of non-use and/or lack of fire will result in a plant community having high litter levels and decadent plants.

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



State 1
Reference

The State narrative is under development.

Community 1.1
Western Wheatgrass/Grass-Like/Forb

This is the interpretive plant community and is considered to be the Reference Plant Community. This community evolved with grazing by large herbivores, occasional prairie fires and periodic flooding events. This plant community can be found on areas that are properly managed with grazing and/or prescribed burning, and sometimes on areas receiving occasional short periods of rest. The potential vegetation is about 70% grasses, 15% grass-like plants and 15% forbs. Western wheatgrass dominates the plant community. Other grasses and grass-like plants include Nuttall's alkaligrass, slender wheatgrass, inland saltgrass, fowl bluegrass, ticklegrass, common spikerush, needle

spikerush and other rushes and sedges. Significant forbs include American licorice, silverleaf cinquefoil, slender cinquefoil and western dock. There are no principal shrubs that occur on this site. 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 properly. Plant litter is properly distributed with very little movement off-site and natural plant mortality is very low. The diversity in plant species allows for both the fluctuation of ponding as well as the occurrence of randomly occurring drought.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1165	1860	2450
Shrub/Vine	220	300	375
Forb	115	240	375
Total	**1500**	**2400**	**3200**

Figure 5. Plant community growth curve (percent production by month). ND5412, Missouri Slope, Lowlands, Cool/Warm-season Mix. Lowlands, cool-season/tall warm-season dominant.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			3	35	35	15	5	5	2		

Community 1.2
Inland Saltgrass/Western Wheatgrass

This plant community is the result of a short-term heavy use, or a longer term continuous grazing and/or annual, early spring seasonal grazing. Repeated defoliation depletes stored carbohydrates, resulting in weakening and eventual death of the most palatable grasses. Lack of litter and reduced plant vigor 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. Inland saltgrass drastically increases and over takes the western wheatgrass as the dominant species with the balance being a few species of cool-season grasses, and grass-likes including Nuttall’s alkaligrass, plains bluegrass, ticklegrass, common spikerush, needle spikerush and other sedges and rushes. Early cool-season grasses including foxtail barley, fowl bluegrass and Kentucky bluegrass begin to invade. Forbs that will invade are curly dock, curlycup gumweed and cocklebur while lambsquarters, pepperweed, povertyweed, purslane and western dock increase. This plant community is relatively stable and well adapted to increased salinity. Plant vigor, litter, frequency and production have decreased. The biological integrity, water and nutrient cycles of this plant community are becoming impaired. This plant community is less productive than the Reference Plant Community.

Table 6. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1290	1700	2110
Shrub/Vine	95	150	205
Forb	115	150	185
Total	**1500**	**2000**	**2500**

Figure 7. Plant community growth curve (percent production by month). ND5404, Missouri Slope, Warm-season Dominant, Cool-season Subdominant. Short warm-season dominant, mid cool-season subdominant & club moss..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	1	5	20	38	25	8	3	0	0	0

Community 1.3
Low Plant Density, Excessive Litter

This plant community occurs when grazing is removed for long periods of time (rest) in the absence of fire. Plant composition is similar to the Reference Plant Community, however individual species production and frequency will be lower. Much of the nutrients are tied up in excessive litter. Standing dead plant residues that are not in contact with a moist soil surface result in a slow nutrient cycling process. Above ground litter also limits sunlight from reaching plant crowns. Many plants, especially the warm-season grasses (inland saltgrass) reduce in density and vigor and typically develop into small but dense colonies. Thick litter and absence of grazing animals (animal impact) and fire reduces seed germination and establishment. This plant community develops after an extended period (10+ years) of non-use by herbivores and exclusion of fire. This plant community is resistant to change without prescribed grazing or fire. The combination of both grazing and fire is most effective in moving this plant community towards the Reference Plant Community. Soil erosion is low. Runoff is similar to the Reference Plant Community. Once this plant community is reached, time and external resources will be needed to see any immediate recovery in diversity.

Table 7. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	785	1400	1950
Forb	220	350	425
Shrub/Vine	195	250	325
Total	**1200**	**2000**	**2700**

Figure 9. Plant community growth curve (percent production by month). ND5406, Missouri Slope, Introduced Cool-season Grasses. Introduced cool-season grasses.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	10	35	35	5	2	8	2	0	0

Pathway 1.1a
Community 1.1 to 1.2

Continuous seasonal (i.e. spring) grazing or heavy, continuous grazing will convert the plant community to the Inland Saltgrass/Western Wheatgrass Plant Community.

Pathway 1.1b
Community 1.1 to 1.3

Non-use and no fire for extended periods will move this plant community to the Low Plant Density, Excessive Litter Plant Community.

Pathway 1.2a
Community 1.2 to 1.1

Prescribed grazing that includes changing season of use and allowing adequate recovery periods between grazing events will lead this plant community back to the Western Wheatgrass/Grass-likes/Forbs Plant Community.

Conservation practices

Prescribed Grazing

Pathway 1.3a

Community 1.3 to 1.1

Prescribed grazing or prescribed burning followed by prescribed grazing will move this plant community toward the Western Wheatgrass/Grass-likes/Forbs Plant Community. If non-native species are dominant, this would require long-term management with prescribed grazing and/or prescribed burning under controlled conditions.

Conservation practices

Prescribed Burning
Prescribed Grazing

State 2
Saltgrass

The State narrative is under development.

Community 2.1
Inland Saltgrass/Foxtail Barley/Fowl Bluegrass

This plant community developed with heavy continuous grazing where adequate recovery periods between grazing events were not allowed. Patches of inland saltgrass sod are typical and foxtail barley and fowl bluegrass is well distributed throughout the community. Nuttall's alkaligrass and western wheatgrass have been greatly reduced in production and vigor, and may persist in remnant amounts. 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 the Reference Plant Community. Loss of key cool season grasses and increased bare ground have negatively impacted energy flow and nutrient cycling. Water infiltration is reduced significantly due to the massive shallow root system "root pan", characteristic of inland saltgrass, and increased bare ground. It will take a long time to bring this plant community back to the Reference Plant Community with management alone. Renovation (mechanical and/or chemical inputs) is not recommended due to high salt content of the soil and saltgrass persistence.

Table 8. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	770	1280	1585
Forb	155	200	250
Shrub/Vine	75	120	165
Total	**1000**	**1600**	**2000**

Figure 11. Plant community growth curve (percent production by month). ND5405, Missouri Slope, Warm-season Short Grass. Warm-season, short grass dominant, and some sedge.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	1	7	18	33	26	10	4	1	0	0

State 3
Annual/Pioneer

The State narrative is under development.

Community 3.1
Annual/Pioneer Perennial

This plant community develops under severe disturbance, long duration flooding events and/or excessive defoliation. This can result from heavy livestock or wildlife concentration, enduring wet cycles and cropping

abandonment (go-back land). The dominant vegetation includes pioneer annual grasses, forbs, invaders, and early successional biennial and perennial species. Grasses may include foxtail barley, which may become dominant along with fowl bluegrass, Nuttall's alkaligrass, and western wheatgrass. The dominant forbs include curly dock, curlycup gumweed, kochia, and other early successional salt tolerant species. Plant species from adjacent ecological sites may become minor components of this plant community. The community is susceptible to non-native species due to severe soil disturbances and relatively high percent of bare ground. This plant community is resistant to change, as long as soil disturbance or severe vegetation defoliation persists, thus holding back secondary plant succession. Significant economic inputs, management and time would be required to move this plant community toward a higher successional stage and a more productive plant community. Secondary succession is highly variable, depending upon availability and diversity of a viable seed bank of higher successional species within the existing plant community and neighboring plant communities.

Transition T1
State 1 to 2

Heavy continuous grazing without adequate recovery opportunity between grazing events, or continuous seasonal (i.e. spring) grazing will move this plant community across an ecological threshold to the Inland Saltgrass/Foxtail Barley/Fowl Bluegrass Plant Community.

Restoration pathway R2
State 2 to 1

Under long-term prescribed grazing, including adequate rest periods, this plant community will move through the successional stages, and may eventually lead to the Inland Saltgrass/Western Wheatgrass Plant Community and possibly the Western Wheatgrass/Grass-likes/Forbs Plant Community. This process will take a long period of time (25+ years).

Conservation practices

Prescribed Grazing

Transition T3
State 2 to 3

This pathway is most commonly associated with the cessation of cropping without the benefit of range or pasture seeding resulting in a "go-back" situation. This may be compounded with excessive grazing and, on this site, soil chemistry which further inhibits the establishment of perennial grasses and forbs.

Restoration pathway R3a
State 3 to 1

Under long-term prescribed grazing and/or removal of disturbance, including adequate rest periods, this plant community will move through the successional stages, and may eventually lead to a plant community resembling the Western Wheatgrass/Grass-likes/Forbs Plant Community. This process will take a long period of time (15+ years). Range seeding followed with prescribed grazing can be used to convert this plant community to one that may resemble the Reference Plant Community.

Conservation practices

Prescribed Grazing

Restoration pathway R3b
State 3 to 2

Heavy, continuous grazing will result in a shift towards the Inland Saltgrass/Foxtail Barley/Fowl Bluegrass Plant Community.

Additional community tables

Table 9. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Western Wheatgrass**			960–1200	
	western wheatgrass	PASM	*Pascopyrum smithii*	960–1200	–
2	**Cordgrass**			0–120	
	cordgrass	SPART	*Spartina*	0–120	–
3	**Other Native Grasses**			240–360	
	Grass, perennial	2GP	*Grass, perennial*	24–120	–
	saltgrass	DISP	*Distichlis spicata*	48–120	–
	slender wheatgrass	ELTRT	*Elymus trachycaulus ssp. trachycaulus*	48–120	–
	fowl bluegrass	POPA2	*Poa palustris*	48–120	–
	Nuttall's alkaligrass	PUNU2	*Puccinellia nuttalliana*	48–120	–
	rough bentgrass	AGSC5	*Agrostis scabra*	48–72	–
	foxtail barley	HOJU	*Hordeum jubatum*	0–48	–
	plains bluegrass	POAR3	*Poa arida*	24–48	–
	scratchgrass	MUAS	*Muhlenbergia asperifolia*	0–24	–
	American sloughgrass	BESY	*Beckmannia syzigachne*	0–24	–
5	**Grass-Likes**			240–360	
	common spikerush	ELPA3	*Eleocharis palustris*	96–192	–
	sedge	CAREX	*Carex*	72–120	–
	needle spikerush	ELAC	*Eleocharis acicularis*	48–72	–
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	48–72	–
	rush	JUNCU	*Juncus*	48–72	–
Forb					
6	**Forbs**			120–360	
	western dock	RUAQ	*Rumex aquaticus*	48–72	–
	silver cinquefoil	POARA3	*Potentilla argentea var. argentea*	48–72	–
	slender cinquefoil	POGRF2	*Potentilla gracilis var. fastigiata*	48–72	–
	knotweed	POLYG4	*Polygonum*	24–48	–
	Forb, perennial	2FP	*Forb, perennial*	24–48	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	24–48	–
	wild mint	MEAR4	*Mentha arvensis*	24–48	–
	redwool plantain	PLER	*Plantago eriopoda*	24	–
	Pursh seepweed	SUCA2	*Suaeda calceoliformis*	0–24	–
	prairie ironweed	VEFA2	*Vernonia fasciculata*	0–24	–
	povertyweed	IVAX	*Iva axillaris*	24	–
	pepperweed	LEPID	*Lepidium*	24	–
	lambsquarters	CHAL7	*Chenopodium album*	24	–
	little hogweed	POOL	*Portulaca oleracea*	0–24	–

Table 10. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Western Wheatgrass**			900–1000	
	western wheatgrass	PASM	*Pascopyrum smithii*	900–1000	–
2	**Cordgrass**			0–20	
	cordgrass	SPART	*Spartina*	0–20	–
3	**Other Native Grasses**			400–500	
	saltgrass	DISP	*Distichlis spicata*	300–400	–
	foxtail barley	HOJU	*Hordeum jubatum*	100–200	–
	fowl bluegrass	POPA2	*Poa palustris*	100–200	–
	Nuttall's alkaligrass	PUNU2	*Puccinellia nuttalliana*	40–100	–
	rough bentgrass	AGSC5	*Agrostis scabra*	60–100	–
	plains bluegrass	POAR3	*Poa arida*	40–60	–
	Grass, perennial	2GP	*Grass, perennial*	20–60	–
	slender wheatgrass	ELTRT	*Elymus trachycaulus ssp. trachycaulus*	0–20	–
4	**Non-Native Grasses**			60–100	
	Kentucky bluegrass	POPR	*Poa pratensis*	60–100	–
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	0–20	–
5	**Grass-Likes**			100–200	
	needle spikerush	ELAC	*Eleocharis acicularis*	60–100	–
	rush	JUNCU	*Juncus*	60–100	–
	sedge	CAREX	*Carex*	40–60	–
	common spikerush	ELPA3	*Eleocharis palustris*	20–40	–
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	20–40	–
Forb					
6	**Forbs**			120–180	
	curly dock	RUCR	*Rumex crispus*	80–160	–
	western dock	RUAQ	*Rumex aquaticus*	40–80	–
	prairie ironweed	VEFA2	*Vernonia fasciculata*	0–60	–
	povertyweed	IVAX	*Iva axillaris*	40–60	–
	pepperweed	LEPID	*Lepidium*	20–40	–
	lambsquarters	CHAL7	*Chenopodium album*	20–40	–
	cocklebur	XANTH2	*Xanthium*	0–40	–
	curlycup gumweed	GRSQ	*Grindelia squarrosa*	0–40	–
	knotweed	POLYG4	*Polygonum*	0–40	–
	little hogweed	POOL	*Portulaca oleracea*	0–40	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	0–20	–
	Forb (herbaceous, not grass nor grass-like)	2FORB	*Forb (herbaceous, not grass nor grass-like)*	0–20	–
	Forb, perennial	2FP	*Forb, perennial*	0–20	–
	wild mint	MEAR4	*Mentha arvensis*	0–20	–
	redwool plantain	PLER	*Plantago eriopoda*	0–20	–

Table 11. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Western Wheatgrass**			300–500	
	western wheatgrass	PASM	*Pascopyrum smithii*	300–500	–
2	**Cordgrass**			0–100	
	cordgrass	SPART	*Spartina*	0–100	–
3	**Other Native Grasses**			300–500	
	fowl bluegrass	POPA2	*Poa palustris*	100–200	–
	Nuttall's alkaligrass	PUNU2	*Puccinellia nuttalliana*	100–200	–
	slender wheatgrass	ELTRT	*Elymus trachycaulus ssp. trachycaulus*	60–120	–
	Grass, perennial	2GP	*Grass, perennial*	40–100	–
	rough bentgrass	AGSC5	*Agrostis scabra*	80–100	–
	saltgrass	DISP	*Distichlis spicata*	40–100	–
	foxtail barley	HOJU	*Hordeum jubatum*	40–60	–
	plains bluegrass	POAR3	*Poa arida*	40–60	–
	American sloughgrass	BESY	*Beckmannia syzigachne*	0–20	–
4	**Non-Native Grasses**			100–200	
	Kentucky bluegrass	POPR	*Poa pratensis*	100–200	–
	Graminoid (grass or grass-like)	2GRAM	*Graminoid (grass or grass-like)*	20–40	–
5	**Grass-Likes**			200–300	
	common spikerush	ELPA3	*Eleocharis palustris*	60–120	–
	sedge	CAREX	*Carex*	40–80	–
	needle spikerush	ELAC	*Eleocharis acicularis*	40–80	–
	rush	JUNCU	*Juncus*	20–40	–
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	20–40	–
Forb					
6	**Forbs**			300–400	
	curly dock	RUCR	*Rumex crispus*	200–300	–
	silver cinquefoil	POARA3	*Potentilla argentea var. argentea*	60–80	–
	western dock	RUAQ	*Rumex aquaticus*	60–80	–
	slender cinquefoil	POGRF2	*Potentilla gracilis var. fastigiata*	40–60	–
	knotweed	POLYG4	*Polygonum*	0–60	–
	lambsquarters	CHAL7	*Chenopodium album*	40–60	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	40–60	–
	wild mint	MEAR4	*Mentha arvensis*	40–60	–
	Forb (herbaceous, not grass nor grass-like)	2FORB	*Forb (herbaceous, not grass nor grass-like)*	20–40	–
	Forb, perennial	2FP	*Forb, perennial*	20–40	–
	little hogweed	POOL	*Portulaca oleracea*	0–40	–
	Pursh seepweed	SUCA2	*Suaeda calceoliformis*	0–40	–
	prairie ironweed	VEFA2	*Vernonia fasciculata*	0–40	–
	cocklebur	XANTH2	*Xanthium*	0–40	–

	pepperweed	LEPID	*Lepidium*	20–40	–
	redwool plantain	PLER	*Plantago eriopoda*	20	–
	curlycup gumweed	GRSQ	*Grindelia squarrosa*	0–20	–
	povertyweed	IVAX	*Iva axillaris*	20	–

Table 12. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Western Wheatgrass**			240–400	
	western wheatgrass	PASM	*Pascopyrum smithii*	240–400	–
3	**Other Native Grasses**			640–800	
	saltgrass	DISP	*Distichlis spicata*	320–640	–
	foxtail barley	HOJU	*Hordeum jubatum*	320–640	–
	fowl bluegrass	POPA2	*Poa palustris*	160–240	–
	Nuttall's alkaligrass	PUNU2	*Puccinellia nuttalliana*	0–32	–
	rough bentgrass	AGSC5	*Agrostis scabra*	16–32	–
	plains bluegrass	POAR3	*Poa arida*	0–16	–
	slender wheatgrass	ELTRT	*Elymus trachycaulus ssp. trachycaulus*	0–16	–
	Grass, perennial	2GP	*Grass, perennial*	0–16	–
5	**Grass-Likes**			80–160	
	needle spikerush	ELAC	*Eleocharis acicularis*	48–80	–
	rush	JUNCU	*Juncus*	48–80	–
	sedge	CAREX	*Carex*	32–48	–
	common spikerush	ELPA3	*Eleocharis palustris*	16–32	–
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	16–32	–
Forb					
6	**Forbs**			160–240	
	curly dock	RUCR	*Rumex crispus*	80–160	–
	western dock	RUAQ	*Rumex aquaticus*	64–96	–
	prairie ironweed	VEFA2	*Vernonia fasciculata*	0–64	–
	povertyweed	IVAX	*Iva axillaris*	32–64	–
	pepperweed	LEPID	*Lepidium*	32–48	–
	knotweed	POLYG4	*Polygonum*	32–48	–
	little hogweed	POOL	*Portulaca oleracea*	0–48	–
	lambsquarters	CHAL7	*Chenopodium album*	32–48	–
	cocklebur	XANTH2	*Xanthium*	0–48	–
	curlycup gumweed	GRSQ	*Grindelia squarrosa*	0–48	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	0–16	–
	Forb (herbaceous, not grass nor grass-like)	2FORB	*Forb (herbaceous, not grass nor grass-like)*	0–16	–
	Forb, perennial	2FP	*Forb, perennial*	0–16	–
	redwool plantain	PLER	*Plantago eriopoda*	0–16	–

Hydrological functions

Water is the principal factor limiting herbage production on this site. The site is dominated by soils in hydrologic groups D. Infiltration varies from moderate to slow and the site is a depression without any runoff potential. In many cases, areas with greater than 75% ground cover have the greatest potential for high infiltration and lower runoff. An exception would be where short grasses form a dense sod and dominate the site. Areas where ground cover is less than 50% have the greatest potential to have reduced infiltration and higher runoff (refer to Section 4, NRCS National Engineering Handbook for runoff quantities and hydrologic curves).

Recreational uses

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

Other products

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

Inventory data references

Information presented here has been derived from NRCS clipping and other inventory data. Also, field knowledge of range-trained personnel was used. Information presented here has been derived from NRCS clipping and other inventory data. All descriptions were peer reviewed and/or field tested by various private, state and federal agency specialist.

Those involved in developing this site description include: Dennis Froemke, NRCS Range Management Specialist; Jeff Printz, NRCS State Range Management Specialist; L. Michael Stirling, NRCS Range Management Specialist; Stan Boltz, NRCS Range Management Specialist; Darrell Vanderbusch, NRCS Resource Soil Scientist; David Dewald, NRCS State Biologist; and Brad Podoll, NRCS Biologist.
Data Source Number of Records Sample Period State County
SCS-RANGE-417 0
Ocular estimates 3 1987 – 2000 ND Dunn, Hettinger, Stark

Other references

High Plains Regional Climate Center, University of Nebraska, 830728 Chase Hall, Lincoln, NE 68583-0728. (http://hprcc.unl.edu)
USDA, NRCS. National Water and Climate Center, 101 SW Main, Suite 1600, Portland, OR 97204-3224. (http://www.wcc.nrcs.usda.gov)
USDA, NRCS. National Range and Pasture Handbook, September 1997
USDA, NRCS. National Soil Information System, Information Technology Center, 2150 Centre Avenue, Building A, Fort Collins, CO 80526. (http://nasis.nrcs.usda.gov)
USDA, NRCS. 2001. The PLANTS Database, Version 3.1 (http://plants.usda.gov). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.
USDA, NRCS, Various Published Soil Surveys.

Contributors

Jeff Printz/Stan Boltz
Jeff Pritnz

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)	J. Printz, S. Boltz, R. Kilian, D. Froemke, M. Rasmusson
Contact for lead author	jeff.printz@nd.usda.gov
Date	05/09/2011
Approved by	Jeff Printz
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 is less than 25%.

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):** Plant cover and litter is at 75% or greater of soil surface and maintains soil surface integrity. Stability class anticipated to be 5 or greater.

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

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** High grass canopy and basal cover and small gaps between plants should reduce raindrop impact.

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 (other than naturally occurring pan) or soil surface crusting 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: Mid, cool-season rhizomatous grasses >

    Sub-dominant: grass-likes = forbs >

    Other: tall, warm-season rhizomatous grasses > mid, cool-season bunch grass > short, warm-season grasses > annual grasses

    Additional: Due to differing root structure and distribution, Kentucky bluegrass and smooth bromegrass do not fit into reference plant community F/S groups.

---

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

---

14. **Average percent litter cover (%) and depth (in):** 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):** Representative value = 2400 lbs/ac with a range of 1500lbs/ac to 3200 lbs/ac (air dry weight) depending upon growing conditions

---

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, Kentucky bluegrass, smooth bromegrass, Russian olive

---

17. **Perennial plant reproductive capability:** All species are capable of reproducing.
