USDA Natural Resources
Conservation Service

Ecological site R071XY044NE
Wet Land

Last updated: 1/08/2025
Accessed: 05/10/2025

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.

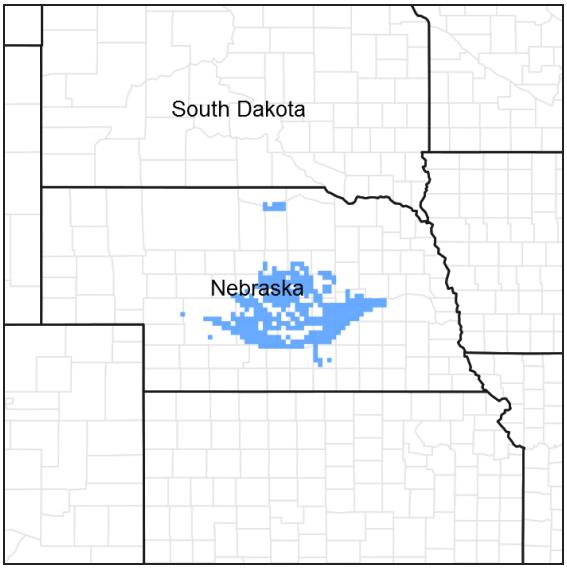


Figure 1. Mapped extent

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): 071X–Central Nebraska Loess Hills

MLRA 71 is named “The Central Nebraska Loess Hills” and is located exclusively in Nebraska. The approximately 5.3 million acre landscape covers all or parts of 21 counties, primarily Custer, Dawson, Buffalo, Sherman, Howard, Valley, Greeley, and Hall. The physical appearance of the landscape is dominated by loess hills dissected by the North, Middle, and South Loup Rivers and their tributaries. The Platte River defines the southern border. The elevation in MLRA 71 ranges from over 3,000 to less than 1,700 feet above sea level, with average local relief stretching from 20 to 200 feet. Average annual precipitation ranges from 21 to 26 inches, with the number of freeze-free days averaging around 200.

Loess overlays the surface of almost all of the uplands in this MLRA. Alluvial clay, silt, sand, and gravel are deposited in the stream and river valleys and can be extensive in the major drainages. Terraces are common in the valleys along the river systems. The predominate soil orders are mesic, udic Mollisols and Entisols, commonly represented by the Coly, Uly, Cozad, Hord, Hall, and Holdrege soil series.

The matrix vegetation type is mixed-grass prairie, with big and little bluestem, switchgrass, Indiangrass, and sideoats and blue grama making up the bulk of the warm-season species, while western wheatgrass is the dominant cool-season species. The primary large-patch vegetative component of the landscape is dominated by needle and thread, prairie sandreed, sand and little bluestem, and blue grama. The majority of the small-patch

communities are associated with upland playas and the wetter sites found along the floodplains.

Forty four percent of the land in this MLRA has been broken out of native prairie and farmed; mostly corn, alfalfa, and some soybeans, while 48 percent of the grasslands remain intact. Livestock grazing, primarily cattle, is a major industry here. Wildlife flourishes in this combination of crop and grassland environment, with both mule and white-tailed deer being the most abundant wild ungulate. A variety of smaller species, including coyote, raccoon, opossum, porcupines, muskrat, beaver, squirrel, and mink thrive in the region, as well as a suite of grassland and upland birds. The rivers, streams, and lakes harbor excellent fisheries.

This landscape developed under Northern Great Plains climatic conditions, light to severe grazing by bison and other large herbivores, and repeated natural or man-caused wildfire. Other biotic and abiotic factors also typically influence soil and site development. This is a disturbance driven ecosystem, evolving under the influences of herbivory, fire, and variable climate. Historically, these processes created a heterogenous mosaic of plant communities and structure heights across the region. Any given site in this landscape experienced fire every 7 to 9 years. The fires were caused both by lightning strikes, and were set by native Americans, who used fire for warfare, signaling, and to refresh the native grasses. These people understood the value of fire as a tool, and that the highly palatable growth following a fire provided both excellent forage for their horses and attracted grazing game animals such as bison and elk.

Fragmentation of the native grasslands by conversion to cropland, transportation corridors, and other development by European man has effectively disrupted the natural fire regime of this ecosystem. This has allowed encroachment by native and introduced shrubs and trees into the remnants of the native prairie throughout the MLRA. Aggressive fire suppression policies have exacerbated this process to the point that shrub and tree encroachment is a major ecological issue in the majority of both native and re-seeded grasslands.

Even as post European settlement's alteration of the fire regime allows the expansion of the woody component of the native prairie, introduction of eastern redcedar as a windbreak component further facilitates invasion by this species. While eastern redcedar is native to Nebraska, the historic population in MLRA 71 was limited to isolated pockets in rugged river drainages that were subsequently insulated from fire, or non-existent. Widespread plantings of windbreaks with eastern redcedar as a primary component has established a seed source for the aggressive woody plant. The ensuing encroachment into the native grasslands degrades the native wildlife habit and causes significant forage loss for domestic livestock. However, since it is not a root-sprouter, eastern redcedar is very susceptible to fire when under six feet tall. Management with prescribed fire is exceedingly effective if applied before this stage. Larger eastern redcedars can also be controlled with fire but requires the use of specially designed ignition and suppression techniques.

Classification relationships

Major Land Resource Area (MLRA: Major Land Resource Area (MLRA)71. (USDA-Natural Resources Conservation Service, 2006)

Ecological site concept

The Wet Land site is found primarily in river and stream valleys. The site is generally saturated or ponded for a long duration to or near the surface during the growing season to a depth of up to 12 inches. The slope is 0 to 1 percent.

Associated sites

R071XY024NE	**Subirrigated** The Subirrigated ecological site is generally positioned above and often adjacent to the Wet Land site.

Similar sites

R071XY024NE	**Subirrigated** The Subirrigated ecological site typically has a water table at 12 to 42 inches below the soil surface. The Wet Land site is generally saturated or ponded for a long duration at or near the surface (0 to 12 inches).

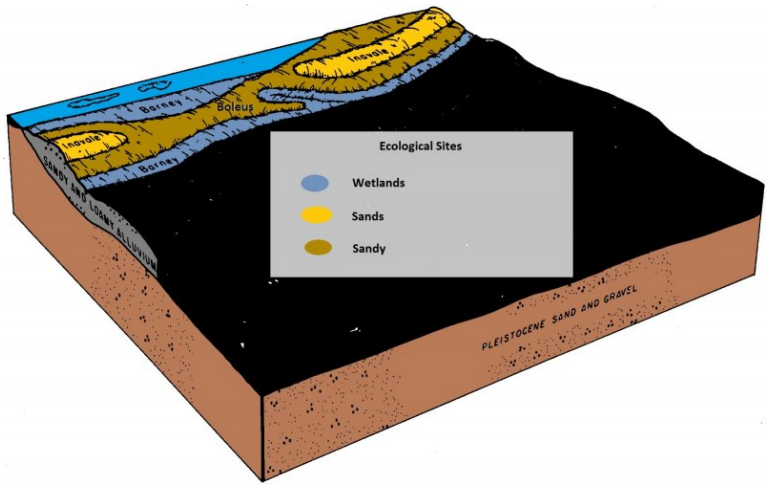


Figure 2. Block diagram

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Spartina pectinata* (2) *Calamagrostis stricta ssp. inexpansa*

Physiographic features

This site occurs on nearly level valley floors and water is at or near the surface for most of the year.

Table 2. Representative physiographic features

Landforms	(1) Flood plain
Runoff class	Negligible to low
Flooding duration	Brief (2 to 7 days)
Flooding frequency	None to frequent
Ponding duration	Brief (2 to 7 days) to very long (more than 30 days)
Ponding frequency	None to frequent
Elevation	1,630–3,075 ft
Slope	0–1%
Ponding depth	3–12 in
Water table depth	0–24 in
Aspect	Aspect is not a significant factor

Climatic features

Hourly winds are estimated to average about 14 miles per hour annually. Occasional strong storms may bring brief periods of high winds with gusts to more than 60 miles per hour. Growth of native cool-season plants begins in early April and continues to about mid-June. Native warm-season plants begin growth in early June and continue to early August. Green up of cool-season plants may occur in September and October.

Table 3. Representative climatic features

Frost-free period (average)	137 days
Freeze-free period (average)	156 days

Precipitation total (average)	26 in

Climate stations used

- (1) CANADAY STEAM PLT [USC00251450], Lexington, NE
- (2) KEARNEY 4 NE [USC00254335], Kearney, NE
- (3) NORTH LOUP [USC00256040], North Loup, NE
- (4) RAVENNA [USC00257040], Ravenna, NE
- (5) STAPLETON 5W [USC00258133], Stapleton, NE
- (6) BROKEN BOW 2 W [USC00251200], Broken Bow, NE
- (7) OCONTO [USC00256167], Oconto, NE
- (8) TAYLOR [USC00258455], Taylor, NE
- (9) ANSELMO 2 SE [USC00250245], Anselmo, NE
- (10) ARNOLD [USC00250355], Arnold, NE
- (11) LOUP CITY [USC00254985], Loup City, NE
- (12) SAINT PAUL [USC00257515], Saint Paul, NE
- (13) GRAND ISLAND AP [USW00014935], Grand Island, NE
- (14) CENTRAL CITY [USC00251560], Central City, NE
- (15) COMSTOCK [USC00251835], Comstock, NE
- (16) GOTHENBURG [USC00253365], Gothenburg, NE
- (17) MASON CITY [USC00255250], Mason City, NE
- (18) OVERTON 3 W [USC00256439], Overton, NE
- (19) BURWELL [USC00251345], Burwell, NE

Influencing water features

This site has a combination of the following physical and hydrological features:
1; groundwater near or above the surface during at least part of the growing season, 2; allows free movement of water and air (anaerobic conditions) throughout much of the root zone, and 3; is ponded or flooded during brief to long periods of the growing season.

Soil features

The features common to all soils in this site are the loamy fine sand and fine sandy loam textured surface soils and slopes of 0 to 1 percent. A number have surfaces of mucky peat and slightly decomposed plant material. These soils are very poorly and poorly drained and formed in eolian sands and sandy to loamy alluvium along streams and rivers. The surface layer is 2 to 19 inches thick. The texture of the subsurface ranges from sand to fine sandy loam in the major soils of this site.

The major soil series correlated to this ecological site include Tryon, Almeria, and Barney. 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.

Figure 7. Barney series profile

Table 4. Representative soil features

Parent material	(1) Eolian deposits (2) Alluvium
Surface texture	(1) Silty clay (2) Loamy sand (3) Loam
Family particle size	(1) Loamy
Drainage class	Very poorly drained to poorly drained
Permeability class	Very slow to rapid
Soil depth	80 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	1–9.3 in
Calcium carbonate equivalent (0-40in)	0–20%
Electrical conductivity (0-40in)	0–4 mmhos/cm
Sodium adsorption ratio (0-40in)	0–10
Soil reaction (1:1 water) (0-40in)	5.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–23%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

Typically, this site is extremely stable under normal management practices. Ditching and draining usually results in a shift to another ecological site, such as the Subirrigated ecological site.

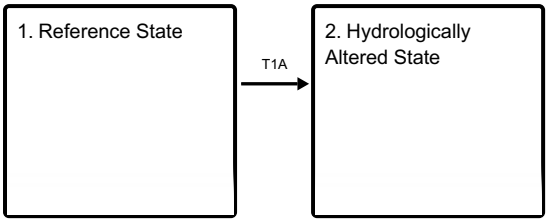
The reference plant community has been determined by study of rangeland relic areas, areas protected from excessive disturbance, seasonal use pastures, appropriately timed and controlled grazing, and historical accounts.

The State and Transition Model (STM) is depicted below and includes a Reference State and a Hydrologically

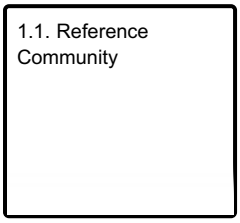
Altered State. The processes that cause the movement between the states are discussed in more detail in the state and descriptions following the diagram.

State and transition model

Ecosystem states



State 1 submodel, plant communities



State 1
Reference State

The Reference State describes the range of vegetative communities that occur on the Wet Land site where the range of natural variability under historic conditions and disturbance regimes is mostly intact. The Reference Community is the only recognized plant community in the Reference State. This state is very resistant to any change that does not affect the associated water table. Ditching has been a traditional management tool on this ecological site. Draining a wetland effectively changes the hydrology of the site and allows it to more closely resemble a Subirrigated ecological site. Once ditched, significant inputs are required to restore and maintain the high water table.

Dominant plant species

- Missouri River willow (*Salix eriocephala*), shrub
- meadow willow (*Salix petiolaris*), shrub
- dwarf false indigo (*Amorpha nana*), shrub
- prairie cordgrass (*Spartina pectinata*), grass
- northern reedgrass (*Calamagrostis stricta ssp. inexpansa*), grass
- slimstem reedgrass (*Calamagrostis stricta*), grass
- sedge (*Carex*), other herbaceous
- marsh arrowgrass (*Triglochin palustris*), other herbaceous
- American licorice (*Glycyrrhiza lepidota*), other herbaceous
- wild mint (*Mentha arvensis*), other herbaceous

Community 1.1
Reference Community

This plant community is very resistant to any change that does not affect the associated water table. With a seasonably high water table that ranges from above the ground surface in wet years to within one foot of the surface in dry years, traditional hayland management usually leaves these areas idle. Primary use is by wildlife species. The potential vegetation is about 55 percent grasses, 30 percent grass-like plants, 10 percent forbs, and 5 percent shrubs. The dominant grass is prairie cordgrass. A wide variety of grass-like plants are present and may comprise up to 30 percent of the plant community. Forbs include Pennsylvania and swamp smartweed, wild strawberry, and paradox (bushy) cinquefoil. Dominant shrubs are false indigo and willow. Runoff as evidenced by patterns of rill, gully, or other water flow is negligible due to their low slope gradient and high intake rate. Pedestalling of plants does not typically occur on this site. The total annual production ranges from 5,200 to 6,400 pounds of air dry vegetation per acre and will average 5,800 pounds per acre.

Dominant plant species

- dwarf false indigo (*Amorpha nana*), shrub
- meadow willow (*Salix petiolaris*), shrub
- Missouri River willow (*Salix eriocephala*), shrub
- sandbar willow (*Salix interior*), shrub
- prairie cordgrass (*Spartina pectinata*), grass
- northern reedgrass (*Calamagrostis stricta ssp. inexpansa*), grass
- slimstem reedgrass (*Calamagrostis stricta*), grass
- sedge (*Carex*), other herbaceous
- spikerush (*Eleocharis*), other herbaceous
- swamp smartweed (*Polygonum hydropiperoides*), other herbaceous
- Virginia strawberry (*Fragaria virginiana*), other herbaceous
- Paradox cinquefoil (*Potentilla paradoxa*), other herbaceous

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	5025	5075	5410
Forb	175	580	700
Shrub/Vine	0	145	290
Total	**5200**	**5800**	**6400**

Figure 9. Plant community growth curve (percent production by month). NE6543, NE/SD Sandhills, Native Grass, Wet. Warm-season dominant, cool-season subdominant, mid & tall grasses.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	20	35	25	10	5	0	0	0

State 2
Hydrologically Altered State

This state is a result of ditching or other draining mechanisms that alter the hydrology of the site to the point that a major reclamation effort is required to return to the reference state.

Transition T1A
State 1 to 2

Significant ditching or draining the Reference State shifts this site to the drier Subirrigated ecological site.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Warm-Season Tallgrass**			1450–4060	
	prairie cordgrass	SPPE	*Spartina pectinata*	1450–4060	–
2	**Grass-Likes**			870–1740	
	sedge	CAREX	*Carex*	870–1740	–
	rush	JUNCU	*Juncus*	0–580	–
	bulrush	SCIRP	*Scirpus*	0–290	–
	spikerush	ELEOC	*Eleocharis*	0–290	–
3	**Cool-Season Tallgrass**			290–2030	
	bluejoint	CACA4	*Calamagrostis canadensis*	0–1160	–
	northern reedgrass	CASTI3	*Calamagrostis stricta ssp. inexpansa*	290–1160	–
	slimstem reedgrass	CASTS5	*Calamagrostis stricta ssp. stricta*	0–870	–
4	**Cool-Season Midgrass**			290–870	
	slender wheatgrass	ELTRT	*Elymus trachycaulus ssp. trachycaulus*	0–580	–
	plains bluegrass	POAR3	*Poa arida*	290–580	–
	Grass, perennial	2GP	*Grass, perennial*	0–116	–
Forb					
5	**Forbs**			116–580	
	Forb, perennial	2FP	*Forb, perennial*	0–116	–
	Virginia strawberry	FRVI	*Fragaria virginiana*	0–116	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	0–116	–
	wild mint	MEAR4	*Mentha arvensis*	0–116	–
	swamp smartweed	POHY2	*Polygonum hydropiperoides*	0–116	–
	Pennsylvania smartweed	POPE2	*Polygonum pensylvanicum*	0–116	–
	Paradox cinquefoil	POPA15	*Potentilla paradoxa*	0–116	–
Shrub/Vine					
6	**Shrubs**			0–290	
	dwarf false indigo	AMNA	*Amorpha nana*	0–174	–
	Missouri River willow	SAER	*Salix eriocephala*	0–174	–
	sandbar willow	SAIN3	*Salix interior*	0–174	–
	meadow willow	SAPE5	*Salix petiolaris*	0–174	–
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–116	–

Animal community

"Wetlands provide migration, breeding, nesting, and feeding habitat for millions of waterfowl, shorebirds, songbirds, and other wildlife. Wetlands are home to thousands of different plant and animal species including many that are threatened or endangered. Nine of Nebraska’s 12 federal endangered and threatened species use wetland areas, as do 19 of Nebraska’s 27 state listed endangered and threatened species.

Many wetlands provide important feeding and rearing habitat for fish. All the state’s amphibians, as well as many reptiles and invertebrates, use wetlands. Wetlands also provide important winter cover for pheasants, deer and other resident wildlife. They also provide a watering source for both domestic livestock and wildlife." (LaGrange,

2004).

Hydrological functions

Soils on this site are in Hydrologic Soil Group D due to high water tables. Although soils are permeable, high water tables limit infiltration. Surrounding upland areas tend to have very permeable soils that cause surface inflow peaks to these sites to be muted. Outflows generally occur only as a result of very intense storms or seepage inflows during very wet years. Many areas are frequently to continuously flooded.

For the interpretive plant community, rills and gullies are not typically present. Water flow patterns should be barely distinguishable if at all present. Pedestals are not typically present. Litter falls in place, and signs of movement are not common. Litter often accumulates to create muck peat like conditions. Chemical and physical crusts are rare. Overall, this site has the appearance of being stable and productive.

Recreational uses

This site provides hunting opportunities for upland game and waterfowl species. The wide variety of plants which bloom from spring until fall have an esthetic value that appeals to visitors. Bird watchers enjoy the variety of shorebirds and other avian fauna that inhabit the wetlands site.

Wood products

No appreciable amount of wood products are generated on this site.

Other products

None noted.

Inventory data references

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range trained personnel were also used.

One R-417 recorded data collected on 10 points
in Custer County in 1982.

Other references

LaGrange, T.G. 2004. Guide to Nebraska's Wetlands. Nebraska Game and Parks Commission. pp 3-4.

High Plains Regional Climate Center, University of Nebraska. (http://hpcc.unl.edu, accessed 12/05/16)

Johnsgaard, P.A. 2001. “The Nature of Nebraska.” University of Nebraska Press.

LaGrange, T.G. 2015. Final Report submitted to EPA for the project entitled: Nebraska’s Wetland Condition Assessment: An Intensification Study in Support of the 2011 National Survey (CD# 97714601), and the related project entitled: Nebraska's Supplemental Clean Water Act §106 Funds, as Related to Participation in National Wetland Condition Assessment (I – 97726201). Nebraska Game and Parks Commission, Lincoln.

Muhs, Daniel R., E. Bettis III, J. Aleinikoff, J. McGeehin, J. Beann, G. Skipp, B. Marshall, H. Roberts, W. Johnson, and R. Benton. "Origin and paleoclimatic significance of late Quaternary loess in Nebraska: Evidence from stratigraphy, chronology, sedimentology, and geochemistry" (2008). USGS Staff -- Published Research. Paper 162. http://digitalcommons.unl.edu/usgsstaffpub/162 Accessed 12/05/16.

U.S. Dept. of Agriculture. NRCS National Ecological Site Handbook. January, 2014.

U.S. Dept. of Agriculture. NRCS National Engineering Handbook, Section 4. August, 2011.

Personal communications with professional ecologists and wildlife experts.

Rolfsmeier, S.B. and G. Steinauer. 2010. "Terrestrial Ecological Systems and Natural Communities of Nebraska", (version IV). Nebraska Natural Heritage Program.

USDA, NRCS. National Water and Climate Center, Portland, OR. http://wcc.nrcs.usda.gov Accessed 12/05/16.

USDA, NRCS.1997. National Range and Pasture Handbook.

USDA, NRCS. National Soil Information System, Information Technology Center, Fort Collins, CO. http://nasis.nrcs.usda.gov Accessed 12/05/16.

USDA, NRCS. 2002. The PLANTS Database, Version 3.5 http://plants.usda.gov Accessed 12/05/16. National Plant Data Center, Baton Rouge, LA.

USDA, NRCS, various published soil surveys.

Contributors

Doug Whisenhunt
Nadine Bishop

Approval

Suzanne Mayne-Kinney, 1/08/2025

Acknowledgments

Many thanks to the review team members and the editor.

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)	Jeff Nichols, Nadine Bishop
Contact for lead author	jeffrey.nichols@usda.gov
Date	11/30/2024
Approved by	Suzanne Mayne-Kinney
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None. Rills are not expected on this site.

---

2. **Presence of water flow patterns:** None. Water flow patterns are not expected on this site.

3. **Number and height of erosional pedestals or terracettes:** None. Pedestals and terracettes are not expected to occur on this site.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is typically 5 percent or less. During periods of above average precipitation and run-on, this site may be ponded for longer than normal durations. During these times, typical vegetation may be temporarily reduced, creating increased areas of bare ground for relatively short periods of time. Bare ground is exposed mineral soil that is not covered by vegetation (basal and/or foliar canopy), litter, standing dead vegetation, gravel/rock, and visible biological crust (e.g., lichen, mosses, algae).

5. **Number of gullies and erosion associated with gullies:** None. Gullies are not expected on this site.

6. **Extent of wind scoured, blowouts and/or depositional areas:** None. Wind scoured and depositional areas are not expected on this site.

7. **Amount of litter movement (describe size and distance expected to travel):** None. Litter movement is not expected to occur on this site.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil stability ratings will be 5 to 6, typically 6. Interspaces are quite small and there should be no difference between interspaces and under canopy. High root content and organic matter will be present in the soil surface.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** The A-horizon is 2 to 19 inches (5.1 to 48.3 cm) thick. Soil texture ranges from sand to fine sandy loam in the major soils of this site. A number of soils have surfaces of mucky peat and slightly decomposed plant material.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Plant community composition of 85 to 95 percent perennial grasses and grass-likes, 2 to 10 percent forbs, and 0 to 5 percent shrubs will optimize infiltration on the site. The grass and grass-like component is made up of native, perennial, warm-season, tall, rhizomatous grasses (25-70%), native, perennial, cool-season tallgrasses (5-35%), native, perennial, grass-likes (15-30%) and Native, perennial, cool-season midgrass (5-15%).

    Infiltration can be adversely impacted by the invasion of Kentucky bluegrass, smooth brome, and reed canarygrass.

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

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: Phase 1.1
1. Native, perennial warm-season, tallgrass, 1450-4060 #/ac, 25-70% (1 species minimum): prairie cordgrass.

Sub-dominant: Phase 1.1
1. Native, perennial, cool-season tallgrass, 290-2030 #/ac, 5-35% (1 species minimum): bluejoint, northern reedgrass, slimstem reedgrass.

2. Grass-like - 870-1740 #/ac, 15-30% (1 species minimum): sedges, rushes, bulrushes, spikerushes.

3. Native, perennial, cool-season midgrass – 290-870 #ac, 5-15% (1 species minimum): slender wheatgrass, plains bluegrass.

Other: Minor - Phase 1.1
1. Native forb (annual and perennial), 115-480 #/ac, 2-10%: Virginia strawberry, American licorice, wild mint, swamp smartweed, Pennsylvania smartweed, Paradox cinquefoil.

2. Shrub, 0-240 #/ac, 0-5%: dwarf false indigo, Missouri River willow, sandbar willow, meadow willow.

Additional: The Reference Community (1.1) is made up of five F/S Groups. These groups in order of expected abundance are native, perennial, warm-season tallgrass; native perennial, cool-season tallgrass; grass-likes; native, perennial, cool-season midgrass; native forbs; and shrubs.

---

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** A few (less than 3 percent) dead centers may occur in bunchgrasses. Shrubs may show some (less than 5%) dead branches as plants age.

---

14. **Average percent litter cover (%) and depth (in):** Plant litter cover is evenly distributed throughout the site and is expected to be 90 to 95 percent and at a depth of 0.75 to 1.0 inches (1.9 to 2.5 cm). Reed canarygrass excessive litter can negatively impact the functionality of this site.

---

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Production is shown in air-dry values. Representative Value (RV) = 5,800 pounds per acre. Low production years = 5,200 pounds per acre. High production years = 6,400 pounds per acre.

---

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:** No non-native invasive species are present. Canada thistle, purple loosestrife, creeping foxtail, and Phragmites australis (common reed) are known invasives that have the potential to be dominant or co-dominant on the site. Consult the state noxious weed and state watch lists for potential invasive species on each ecological site. Consult the state noxious weed and state watch lists for potential invasive species on each ecological site. NOTE: Invasive plants (for the purposes of the IIRH protocol) are plant species that are typically not found on the ecological site or should only be in trace or minor categories under the natural disturbance regime and have the potential to become a dominant or codominant species on the site if their establishment and growth are not actively controlled by natural

disturbances or management interventions. Species listed characterize degraded states AND have the potential to become a dominant or co-dominant species.

---

17. **Perennial plant reproductive capability:** All perennial species exhibit high vigor relative to climatic conditions. Perennial grasses should have vigorous rhizomes or tillers; vegetative and reproductive structures are not stunted. All perennial species should be capable of reproducing annually.
