

# Ecological site R066XY046NE Subirrigated

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## General information

**Approved.** An approved ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model, enough information to identify the ecological site, and full documentation for all ecosystem states contained in the state and transition model.



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: 43i – Keya Paha Tablelands.

## Associated sites

R066XY032NE	<b>Sandy 18-22" P.Z.</b> Sandy 18-22" P.Z.
R066XY033NE	<b>Sands 18-22 P.Z.</b> Sands 18-22" P.Z.
R066XY044NE	<b>Wet Land</b> Wetland
R066XY045NE	<b>Wet Subirrigated (obsolete, absorbed by sub/wetland)</b> Wet Subirrigated
R066XY054NE	<b>Sandy 22-25 P.Z.</b> Sandy 22-25" P.Z.
R066XY055NE	<b>Sands 22-25 P.Z.</b> Sands 22-25" P.Z.

## Similar sites

R066XY045NE	<b>Wet Subirrigated (obsolete, absorbed by sub/wetland)</b> Wet Subirrigated [less big bluestem; no little bluestem, more prairie cordgrass; bluejoint reedgrass common; more production]
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Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Andropogon gerardii</i> (2) <i>Sorghastrum nutans</i>

## Physiographic features

This site occurs on level to nearly level areas of interdunes and along floodplains and drainageways that have soil water moderately close to the ground surface. Where this site occurs on interdunes, it is not subject to flooding. This site receives runoff from areas higher on the landscape.

Table 2. Representative physiographic features

Landforms	(1) Interdune (2) Flood plain (3) Drainageway
Flooding duration	Brief (2 to 7 days)
Flooding frequency	Occasional
Elevation	1,900–3,000 ft
Slope	0–2%
Ponding depth	0 in
Water table depth	18–36 in
Aspect	Aspect is not a significant factor

## Climatic features

MLRA 66 is considered to have a continental climate – cold winters and hot summers, low 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 the winds move freely across the plains and account for rapid changes in temperature.

Annual precipitation ranges from 18 to 25 inches per year. The normal average annual temperature is about 48° F. January is the coldest month with average temperatures ranging from about 19° F (Bonesteel, SD) to about 23° F (Ainsworth, NE). July is the warmest month with temperatures averaging from about 73° F (Harrington, SD) to about 75° F (Gregory, SD). The range of normal average monthly temperatures between the coldest and warmest months is about 54° F. This large annual range attests to the continental nature of this area's climate. Hourly winds average about 10 miles per hour annually, ranging from about 11 miles per hour during the spring to about 9 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 mid to late March and continues to late June. Native warm season plants begin growth in early May and continue to late August. Green up of cool season plants may occur in September and October when adequate soil moisture is present.

Table 3. Representative climatic features

Frost-free period (average)	154 days
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Freeze-free period (average)	173 days
Precipitation total (average)	25 in

## Influencing water features

This ecological site has a combination of physical and hydrological features that: 1) provide season-long ground water within 3.5 feet of the surface, 2) allows relatively free movement of water and air in the upper part of the soil, and 3) are rarely or occasionally flooded.

## Soil features

The features common to all soils in this site are the fine sand and loamy textured surface soils and slopes of 0 to 2 percent. The soils in this site are somewhat poorly drained and formed in eolian sand and/or sandy alluvium. The surface layer is 3 to 10 inches thick. The texture of the subsurface ranges from loam to fine sand.

Runoff as evidenced by patterns of rill, gully, or other water flow is negligible due to the low slope gradient and high intake rate of these soils. Some pedestalling of plants occurs, but it is not very evident on casual observation and occurs on less than 5% of the plants.

More information can be found in the various soil survey reports. Contact the local USDA Service Center for soil survey reports that include more detail specific to your location.

**Table 4. Representative soil features**

Surface texture	(1) Loam (2) Fine sandy loam (3) Fine sand
Family particle size	(1) Sandy
Drainage class	Somewhat poorly drained
Permeability class	Moderately slow to rapid
Soil depth	80 in
Surface fragment cover <=3"	0–10%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	3–8 in
Calcium carbonate equivalent (0-40in)	0–40%
Electrical conductivity (0-40in)	0–8 mmhos/cm
Sodium adsorption ratio (0-40in)	0–6
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%

## Ecological dynamics

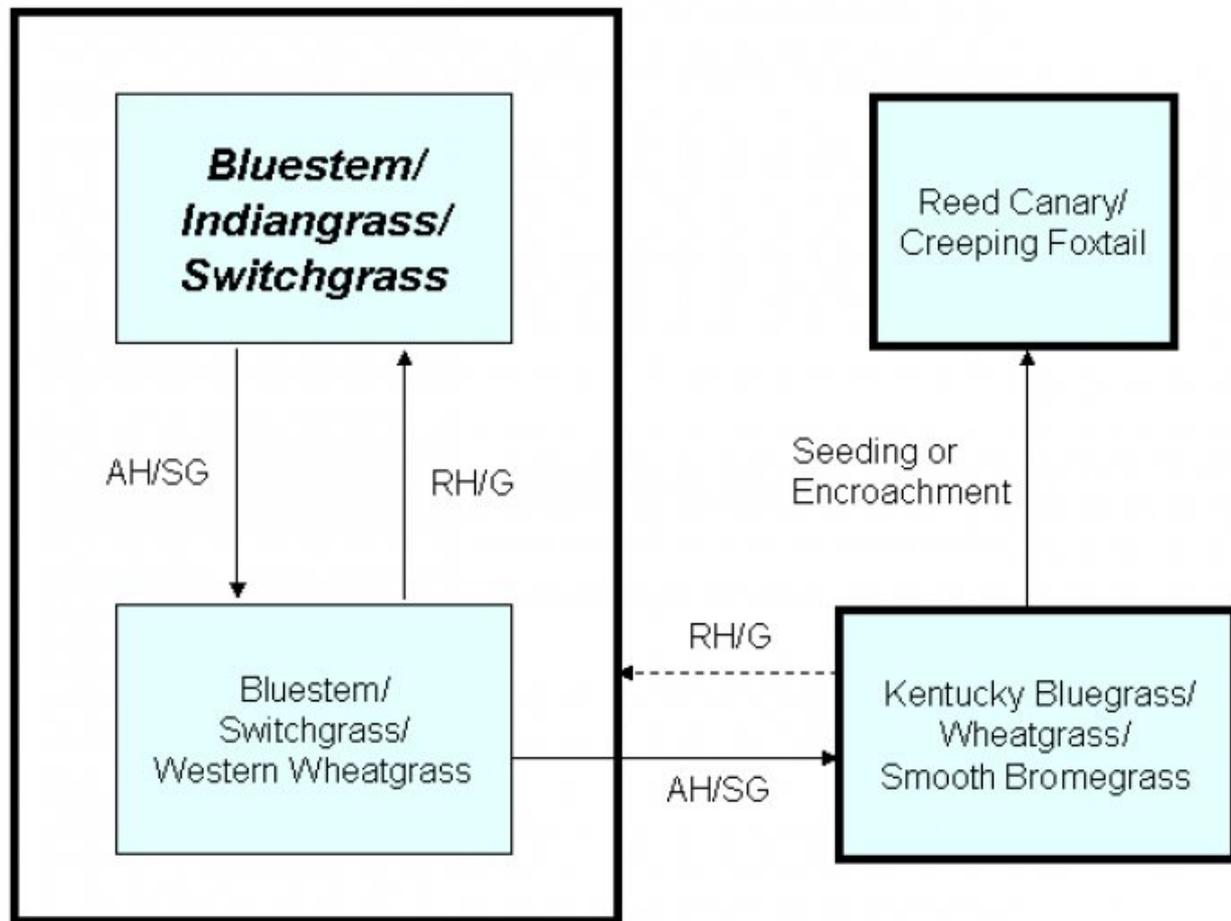
This site developed under Northern Great Plains climatic conditions, light to severe grazing by bison and other large herbivores, sporadic natural or man-caused wildfire (often of light intensities), and other biotic and abiotic factors

that typically influence soil/site development. Changes will occur in the plant communities due to short-term weather variations, impacts of native and/or exotic plant and animal species, and management actions. While the following plant community descriptions describe more typical transitions between communities that will occur, severe disturbances, such as periods of well-below average precipitation, can cause significant shifts in plant communities and/or species composition.

As this site deteriorates, species such as redtop, Kentucky bluegrass, slender wheatgrass and smooth bromegrass will increase. Warm-season grasses such as Indiangrass and big bluestem will decrease in frequency and production. Light grazing and the absence of haying allows woody plant encroachment such as cottonwood into any of the plant communities described below.

Interpretations are primarily based on the Bluestem/Indiangrass/Switchgrass Plant Community. It 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.

### **State and transition model**



**AH/SG** – Annual haying/summer grazing; **RH/G** – Rotational haying/grazing.

## State 1 Bluestem/Indiangrass/Switchgrass Plant Community

### Community 1.1 Bluestem/Indiangrass/Switchgrass Plant Community

Interpretations are primarily based on the Bluestem/Indiangrass/Switchgrass Plant Community (this is also considered climax). This site evolved with grazing by large herbivores and is well suited for grazing by domestic livestock. This plant community is found on areas that are properly managed with grazing. Harvesting hay at a different time during the growing season each year allows this plant community to persist. The potential vegetation is about 75% grasses, 10% grass-like plants, 10% forbs, and 5% woody plants. Tall, warm-season grasses dominate. The major grasses include big bluestem, Indiangrass, little bluestem, switchgrass, and grass-likes include sedges, rushes, and bulrushes. Other grasses occurring on this plant community include plains bluegrass, slender wheatgrass, and western wheatgrass. This plant community is extremely resilient and well adapted to the Northern Great Plains climatic conditions. The diversity in plant species allows for high drought tolerance. This is a healthy and sustainable plant community (site/soil stability, watershed function, and biologic integrity). Transitional pathways and/or community pathways leading to other plant communities are as follows: - Haying or grazing that typically occurs at the same time of year every year can shift this plant community to the Bluestem/Switchgrass/Western Wheatgrass Plant Community. Haying or grazing at set times during the growing season can reduce plant diversity and reduce vigor of desirable plants.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	3280	4320	5400
Forb	220	360	550
Shrub/Vine	0	120	250
<b>Total</b>	<b>3500</b>	<b>4800</b>	<b>6200</b>

Figure 5. Plant community growth curve (percent production by month). NE6643, Eroded Tableland, lowland warm-season dominant.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	7	15	25	25	17	6	2	0	0

## State 2 Bluestem/Switchgrass/Western Wheatgrass Plant Community

### Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>Tall Warm-Season Grasses</b>			1680–2640	
	big bluestem	ANGE	<i>Andropogon gerardii</i>	960–1920	–
	Indiangrass	SONU2	<i>Sorghastrum nutans</i>	480–960	–
	switchgrass	PAVI2	<i>Panicum virgatum</i>	240–720	–
	prairie cordgrass	SPPE	<i>Spartina pectinata</i>	0–480	–
	marsh muhly	MURA	<i>Muhlenbergia racemosa</i>	0–240	–
2	<b>Mid Warm-Season Grasses</b>			480–1200	
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	480–960	–

	sideoats grama	BOCU	<i>Bouteloua curtipendula</i>	96–480	–
	purple lovegrass	ERSP	<i>Eragrostis spectabilis</i>	0–240	–
3	<b>Rhizomatous Cool-Season Grasses</b>			96–384	
	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	0–240	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	48–240	–
	plains bluegrass	POAR3	<i>Poa arida</i>	0–144	–
	prairie wedgescale	SPOB	<i>Sphenopholis obtusata</i>	0–144	–
4	<b>Cool-Season Bunch Grasses</b>			48–240	
	Canada wildrye	ELCA4	<i>Elymus canadensis</i>	48–240	–
	needle and thread	HECOC8	<i>Hesperostipa comata ssp. comata</i>	0–240	–
	porcupinegrass	HESP11	<i>Hesperostipa spartea</i>	0–240	–
	foxtail barley	HOJU	<i>Hordeum jubatum</i>	0–144	–
5	<b>Other Native Grasses</b>			0–144	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–144	–
	reed canarygrass	PHAR3	<i>Phalaris arundinacea</i>	0–144	–
6	<b>Grass-Likes</b>			96–480	
	sedge	CAREX	<i>Carex</i>	48–336	–
	Sartwell's sedge	CASA8	<i>Carex sartwellii</i>	48–336	–
	awlfuit sedge	CAST5	<i>Carex stipata</i>	0–240	–
	upright sedge	CAST8	<i>Carex stricta</i>	0–240	–
	rush	JUNCU	<i>Juncus</i>	0–240	–
	bulrush	SCHOE6	<i>Schoenoplectus</i>	0–240	–
	Grass-like (not a true grass)	2GL	<i>Grass-like (not a true grass)</i>	0–240	–
	spikerush	ELEOC	<i>Eleocharis</i>	0–144	–
<b>Forb</b>					
8	<b>Forbs</b>			240–480	
	Forb, native	2FN	<i>Forb, native</i>	48–240	–
	American licorice	GLLE3	<i>Glycyrrhiza lepidota</i>	48–144	–
	Maximilian sunflower	HEMA2	<i>Helianthus maximiliani</i>	48–144	–
	stiff sunflower	HEPA19	<i>Helianthus pauciflorus</i>	0–144	–
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	48–144	–
	cinquefoil	POTEN	<i>Potentilla</i>	48–144	–
	giant goldenrod	SOGI	<i>Solidago gigantea</i>	0–144	–
	Missouri goldenrod	SOMI2	<i>Solidago missouriensis</i>	0–96	–
	white heath aster	SYER	<i>Symphotrichum ericoides</i>	48–96	–
	upright prairie coneflower	RACO3	<i>Ratibida columnifera</i>	0–96	–
	western dock	RUAQ	<i>Rumex aquaticus</i>	0–96	–
	blackeyed Susan	RUHI2	<i>Rudbeckia hirta</i>	0–96	–
	showy milkweed	ASSP	<i>Asclepias speciosa</i>	48–96	–
	false boneset	BREU	<i>Brickellia eupatorioides</i>	0–96	–
	white prairie clover	DACA7	<i>Dalea candida</i>	0–96	–
	purple prairie clover	DAPU5	<i>Dalea purpurea</i>	48–96	–
	Illinois bundleflower	DEIL	<i>Desmanthus illinoensis</i>	0–96	–

	tall blazing star	LIAS	<i>Liatris aspera</i>	48–96	–
	stiff goldenrod	OLRI	<i>Oligoneuron rigidum</i>	48–96	–
	Pennsylvania smartweed	POPE2	<i>Polygonum pennsylvanicum</i>	0–96	–
	western yarrow	ACMIO	<i>Achillea millefolium var. occidentalis</i>	48–96	–
	autumn onion	ALST	<i>Allium stellatum</i>	0–96	–
	Cuman ragweed	AMPS	<i>Ambrosia psilostachya</i>	48–96	–
	smooth horsetail	EQLA	<i>Equisetum laevigatum</i>	0–48	–
	Virginia strawberry	FRVI	<i>Fragaria virginiana</i>	0–48	–
	ragwort	SENEC	<i>Senecio</i>	0–48	–
	swamp verbena	VEHA2	<i>Verbena hastata</i>	0–48	–
<b>Shrub/Vine</b>					
9	<b>Shrubs</b>			0–240	
	Shrub (>.5m)	2SHRUB	<i>Shrub (&gt;.5m)</i>	0–144	–
	leadplant	AMCA6	<i>Amorpha canescens</i>	0–144	–
	rose	ROSA5	<i>Rosa</i>	0–144	–
	willow	SALIX	<i>Salix</i>	0–144	–
	western snowberry	SYOC	<i>Symphoricarpos occidentalis</i>	0–144	–
	western poison ivy	TORY	<i>Toxicodendron rydbergii</i>	0–48	–

## Animal community

Grazing by domestic livestock is one of the major income-producing industries in the area. Rangeland in this area may provide year-long 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

Moisture conditions are ideal for forage production on this site. Soils on this site are mostly in Hydrologic Soil Group A, but may include soils in Group B, and local areas in Group C. Although most of these soils are very permeable, water tables provide subirrigation of grasses and other vegetation. Surrounding upland areas tend to also have permeable soils and surface inflow peaks on these sites are often muted. These sites are rarely to occasionally flooded.

For the interpretive plant community, rills and gullies should not typically be present. Water flow patterns should be barely distinguishable if at all present. Pedestals are only slightly present. Litter falls in place, and signs of movement are not common. Chemical and physical crusts are rare to non-existent. Cryptogamic crusts may be present but are not significant for hydrologic considerations. Overall this site has the appearance of being very stable and extremely productive.

## Recreational uses

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

## Wood products

No appreciable wood products are present on the site.

## 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 data and other inventory data. Field observations from trained rangeland personnel were also used. Those involved in developing this site include: Stanley Boltz, State Rangeland Management Specialist, NRCS South Dakota; Dana Larsen, State Rangeland Management Specialist, NRCS Nebraska; Wayne Bachman, Soil Scientist, NRCS South Dakota; Patrick Cowser, Soil Scientist, NRCS; Roger Hammer, Soil Scientist, NRCS; Mike Hanna, Resource Conservationist, NRCS; Jerry Harding, Soil Conservationist, NRCS

## Other references

High Plains Regional Climate Center, University of Nebraska, 830728 Chase Hall, Lincoln, NE 68583-0728. (<http://www.hprcc.unl.edu/>)

USDA, NRCS. National Water and Climate Center, 101 SW Main, Suite 1600, Portland, OR 97204-3224. (<http://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, 2002. National Soil Survey Handbook, title 430-VI. (<http://soils.usda.gov/technical/handbook/>)

## Contributors

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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.

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Date	08/01/2006
Approved by	Stan Boltz
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

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

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

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3. **Number and height of erosional pedestals or terracettes:** None.
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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is typically less than 5 percent.
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5. **Number of gullies and erosion associated with gullies:** None.
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6. **Extent of wind scoured, blowouts and/or depositional areas:** None.
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7. **Amount of litter movement (describe size and distance expected to travel):** Litter falls in place.
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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil aggregate stability ratings should typically be 5 to 6, normally 6. Surface organic matter adheres to the soil surface. Soil surface fragments will typically retain structure indefinitely when dipped in distilled water.
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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** A-horizon should be 10 to 30 inches thick with black to very dark gray colors when moist. Structure typically is medium to fine granular in the upper A-horizon.
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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Deep rooted species (mid and tall rhizomatous cool- and warm-season grasses and grass-likes) with fine and coarse roots positively influences infiltration.
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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None.
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12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**
- Dominant: Tall, warm-season rhizomatous grasses >>
- Sub-dominant: Mid, warm-season grasses >
- Other: Grass-like species = forbs > mid, cool-season rhizomatous grasses > cool-season bunchgrasses = shrubs
- Additional: Other grasses in other functional groups occur in minor amounts.
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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Very little evidence of decadence or mortality.

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14. **Average percent litter cover (%) and depth ( in):** Litter cover is typically 80 to 90 percent, and depth of litter ranges from 0.5 to 1 inches.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Total annual production ranges from 3,500 to 6,200 pounds/acre, with the reference values being 4,800 pounds/acre (air-dry basis).

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** State and local noxious weeds; Kentucky bluegrass may be prevalent during dry cycles, but will typically not dominate the site. Russian olive can dominate this site in localized areas. Most invasive species will occupy the perimeter of this site.

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

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