

Ecological site R054XY032ND Subirrigated

Accessed: 05/03/2024

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.

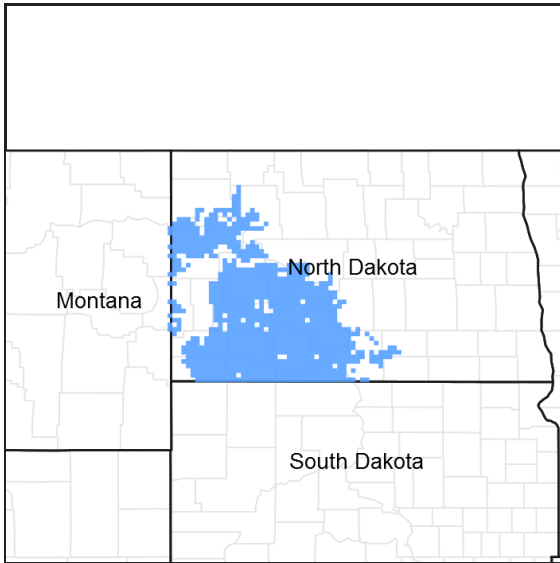


Figure 1. Mapped extent

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

R054XY023ND	Loamy Overflow
R054XY024ND	Saline Lowland
R054XY036ND	Shallow Marsh
R054XY037ND	Wet Meadow

Similar sites

R054XY023ND	<p>Loamy Overflow [Moderately well drained soils in intermittent drainage ways, swales and areas that frequently receive additional moisture throughout the growing season, with no apparent water table. Indicator species: big bluestem with western wheatgrass and green needlegrass, American licorice, and western snowberry. The site has no switchgrass or prairie cordgrass, less big bluestem, more green needlegrass and western wheatgrass; less production, no water table.]</p>
-------------	---

Table 1. Dominant plant species

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

Physiographic features

This site occurs on gently undulating to rolling sedimentary uplands.

Table 2. Representative physiographic features

Landforms	(1) Alluvial fan (2) Alluvial flat (3) Flood plain
Flooding duration	Long (7 to 30 days)
Flooding frequency	None to occasional
Ponding frequency	None
Elevation	488–1,097 m
Slope	0–2%
Water table depth	15–183 cm
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)	457 mm

Influencing water features

Soil features

The common features of soils in this site are the silt loam to fine sandy loam textured subsoils and slopes of 0 to 2 percent. The soils in this site are poorly drained and some what poorly and formed in alluvium. The fine sandy loam to silt loam surface layer is 5 to 16 inches thick. The soils have a moderately rapid to moderate infiltration rate. This site should show slight to no evidence of rills, wind scoured areas or pedestalled plants. No water flow paths are seen on this site. The soil surface is stable and intact. Sub-surface soil layers are non-restrictive to water movement and root penetration.

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) Loam (2) Silt loam (3) Fine sandy loam
Family particle size	(1) Loamy
Drainage class	Poorly drained to somewhat poorly drained
Permeability class	Moderate to moderately rapid
Soil depth	51–152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	7.62–17.78 cm
Calcium carbonate equivalent (0-101.6cm)	0–35%
Electrical conductivity (0-101.6cm)	0–8 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–5
Soil reaction (1:1 water) (0-101.6cm)	6.1–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–40%
Subsurface fragment volume >3" (Depth not specified)	0–20%

Ecological dynamics

The site developed under Northern Great Plains climatic conditions, and included natural influence of large herbivores 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 along with the high productivity of the subirrigated plants, this site is considered stable. Under continued adverse impacts, a slow decline in vegetative vigor and composition will occur. Under favorable vegetative management treatments the site can quickly return to the Reference Plant Community.

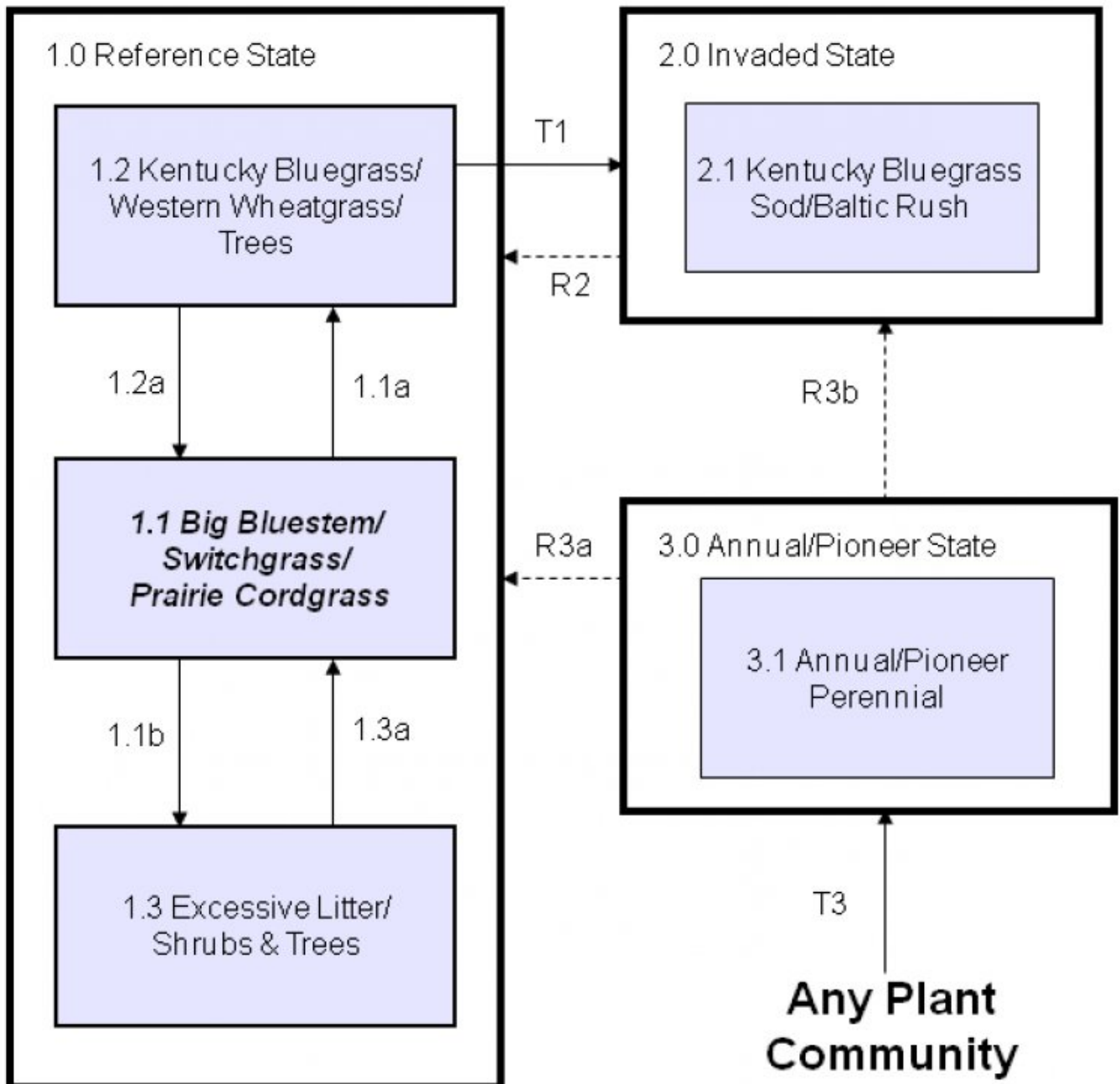
The plant community upon which interpretations are primarily based is the Reference Plant Community. The Reference Plant Community has been determined by study of rangeland relic areas, areas protected from excessive disturbance, and areas under long-term rotational grazing regimes. Trends in plant community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

As changes occur from continuous grazing without adequate recovery opportunities between grazing events, species such as Kentucky bluegrass, western wheatgrass and Baltic rush will invade or increase. Kentucky bluegrass may eventually form a dense sod. Grasses such as big bluestem, prairie cordgrass, and switchgrass will decrease in frequency and production and can be removed from the site. Non-use and lack of fire will cause litter levels and plant decadence or mortality to increase. Under extended periods of non-use and/or lack of fire, both invading grass and forb species such as Kentucky blue, fowl bluegrass, sweetclover and possibly Canada thistle will dominate the site along with a heavy increase of shrub and trees including invading trees such as Russian olive. This will eventually result in a wooded plant community.

Due to a general invasion of exotic species (such as Kentucky bluegrass and smooth brome grass) across the MLRA within this site, returning to the 1.1 Big Bluestem/Switchgrass/Prairie Cordgrass Plant Community Phase may not be possible.

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
Big Bluestem/Switchgrass/Prairie Cordgrass**

This is the interpretive plant community and is considered to be the Reference Plant Community. This plant community evolved with grazing by large herbivores and is well suited for grazing by domestic livestock and can be found on areas that are grazed and where the grazed plants receive adequate periods of rest during the growing season in order to recover. Historically, fires occurred infrequently but were a very important natural effect on this site. The potential vegetation is about 70% grasses and grass-like, 10% forbs, 10% shrubs and 10% trees of the total air-dry weight. Tall warm season grasses dominate this community. The major grasses include big bluestem, switchgrass, prairie cordgrass and little bluestem. Other grasses and grass-like occurring on the community include western wheatgrass, green needlegrass, northern reedgrass, Canada wildrye, sedges and rush species.

Key forbs include American licorice, sunflower, aster, goldenrod and mint. Shrubs and tree species that recover quickly after fire events are juneberry, western snowberry, willows, boxelder, hawthorn, chokecherry and cottonwood. This plant community is diverse, stable, productive and is well adapted to the Northern Great Plains. The high water table supplies much of the moisture for plant growth. 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 a high tolerance to a fluctuating water table. Run-off from adjacent sites and moderate or high available water capacity provides a favorable soil-water-plant relationship.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	3043	3475	3839
Shrub/Vine	219	336	476
Tree	219	336	476
Forb	219	336	476
Total	3700	4483	5267

Figure 5. Plant community growth curve (percent production by month). ND5403, Missouri Slope, Native Grasslands, Warm-season dominant. Warm-season dominant.

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 1.2 Kentucky Bluegrass/Western Wheatgrass/Trees

This plant community results from continuous grazing without adequate recovery periods between each grazing event during the growing season. Recognition of this plant community will enable the land user to implement key management actions before a significant ecological threshold is crossed. Kentucky bluegrass and western wheatgrass are the dominant species. Big bluestem, green needlegrass, switchgrass and Indiangrass are greatly reduced. Forb species would include asters, goldenrod, cudweed sagewort, heath aster, wavyleaf thistle and western yarrow. Invasive forbs are sweetclover, dandelion, and possibly Canada thistle. Shrubs and tree regeneration have completely disappeared leaving little to no shrub understory beneath large trees. Plant diversity and production have been reduced. The soil remains stable. Water cycle, nutrient cycle and energy flow is slightly reduced but continues to adequately function. Water table tends to rise closer to the surface, which favors an increase of Baltic rush and common spikerush.

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1580	2707	3794
Forb	247	353	476
Tree	163	252	364
Shrub/Vine	28	50	73
Total	2018	3362	4707

Figure 7. Plant community growth curve (percent production by month). ND5409, Missouri Slope, Lowland, Cool-season Dominant. Lowland, cool-season dominant, tall grasses and grass-likes..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	10	37	35	5	2	8	0	0	0

Community 1.3 Excessive Litter/Shrubs & Trees

This plant community develops after an extended period (10 to 20 years or more) of non-use and exclusion of fire. Eventually litter levels become high enough to reduce native grass vigor, diversity and density. Kentucky bluegrass flourishes in this environment and may dominate this plant community. Common forbs include Canada goldenrod, American licorice, cudweed sagewort, and dogbane. Invading forbs are Canada thistle, sweetclover and dandelion. Shrubs such as western snowberry, willow, juneberry, rose, and chokecherry will increase in density and cover. Trees species such as green ash, boxelder, cottonwood, peachleaf willow and others tend to produce a dense canopy cover shading out the grass understory. This plant community is resistant to change without prescribed grazing and 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.

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	2146	2186	2270
Tree	247	504	729
Shrub/Vine	247	420	560
Forb	163	252	364
Total	2803	3362	3923

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 grazing without adequate recovery periods between grazing events will shift this plant community to the Kentucky Bluegrass/Western Wheatgrass/Trees Plant Community.

Pathway 1.1b Community 1.1 to 1.3

Non-use and no fire will move this plant community to the Excessive Litter/Shrub & Trees Plant Community.

Pathway 1.2a Community 1.2 to 1.1

Prescribed grazing or prescribed burning followed by prescribed grazing, will move this plant community toward the Reference Plant Community. This would require long-term management with prescribed grazing and prescribed burning under controlled conditions.

Conservation practices

Prescribed Burning
Prescribed Grazing

Pathway 1.3a Community 1.3 to 1.1

Periodic prescribed burning along with prescribed grazing will move this plant community toward the Big Bluestem/Switchgrass/Prairie Cordgrass Plant Community. This would require long-term management with both prescribed grazing and prescribed burning under controlled conditions.

Conservation practices

Prescribed Burning
Prescribed Grazing

**State 2
Invaded**

The State narrative is under development.

**Community 2.1
Kentucky Bluegrass Sod/Baltic Rush**

This plant community developed with heavy continuous grazing without adequate recovery periods between grazing events. Kentucky bluegrass and Baltic rush, along with fowl bluegrass and common spikerush dominate the community. Kentucky bluegrass can develop into a thick sod. Prairie cordgrass, little bluestem, Indiangrass, green needlegrass, northern reedgrass and porcupine grass have been removed. Big bluestem, switchgrass, and western wheatgrass may persist in trace amounts, greatly reduced in vigor, and in some instances, not readily seen. Western yarrow, dandelion and goldenrod have increased. Key shrubs have been severely reduced in vigor or removed completely. A few scattered old decadent trees do remain. This plant community is resistant to change due to grazing tolerance of Kentucky bluegrass. Production and diversity is significantly reduced when compared to the Reference Plant Community. Loss or reduction of cool season grasses, tall warm season grasses, and shrub component have negatively impacted energy flow and nutrient cycling. Water infiltration is reduced significantly due to the massive shallow root system “root pan”, characteristic of sodbound Kentucky bluegrass. The water table has risen closer to the surface that greatly favors the rush species. It will take a very long time to restore this plant community back to the Reference Plant Community with improved management. Renovation would be very costly.

Table 8. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1401	1849	2606
Forb	219	280	364
Tree	62	90	118
Shrub/Vine	–	22	50
Total	1682	2241	3138

Figure 11. 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

**State 3
Annual/Pioneer**

The State narrative is under development.

**Community 3.1
Annual/Pioneer Perennial**

This plant community develops under severe disturbance and/or excessive defoliation. This can result from heavy livestock or wildlife concentration, and cropping abandonment (go-back land). The dominant vegetation includes pioneer annual grasses, forbs, invaders, and early successional biennial and perennial species. Grasses and grass-like species may include Baltic rush, common spikerush, sedges, Kentucky bluegrass, smooth bromegrass, prairie junegrass and western wheatgrass. The dominant forbs include curlycup gumweed, marehail, salsify, kochia, field bindweed, kochia, thistles, cudweed sage, western ragweed, pussytoes, prostrate verbena and other early successional species. Shrubs that may be present include dogwood and willow. Plant species from adjacent ecological sites may become minor components of this plant community. The community also is susceptible to invasion of other non-native species such as Canada thistle, due to severe soil disturbances and increased bare ground. Many other annual and perennial forbs, including non-native species, may invade the site. This plant community is resistant to change, as long as soil disturbance or severe vegetation defoliation persists, thus holding back secondary plant succession. Soil erosion is potentially high in this vegetation state. Reduced surface cover, low plant density, low plant vigor, loss of root biomass, and soil compaction, all contribute to decreased water infiltration, increased runoff, and accelerated erosion rates. 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. This plant community can be renovated to improve the production capability, but management changes would be needed to maintain the new plant community. The total annual production ranges from 500 to 2000 lbs./ac. (air-dry weight) depending upon vegetative conditions.

Transition T1 State 1 to 2

Heavy continuous grazing without adequate recovery periods between grazing events will move this plant community across an ecological threshold to the Kentucky Bluegrass Sod/Baltic Rush Plant Community.

Restoration pathway R2 State 2 to 1

Long term prescribed grazing with adequate recovery periods following each grazing event and proper stocking over long periods of time will move this plant community toward the Kentucky Bluegrass/Western Wheatgrass/Trees Plant Community. It may eventually return to the Reference Plant Community through associated successional plant community stages assuming an adequate seed/vegetative source is available. This process may take greater than 20 years.

Conservation practices

Prescribed Grazing

Transition T3 State 2 to 3

Excessive defoliation (i.e., areas of heavy animal concentration) or cropped go-back land with continuous grazing will convert the plant community to the Annual/Pioneer Perennial Plant Community.

Restoration pathway R3a State 3 to 1

Under long-term prescribed grazing and removal of disturbance, including adequate rest periods, this plant community will move through the successional stages, and may eventually lead to the Big Bluestem/Switchgrass/Prairie Cordgrass Plant Community. Depending on the slope, aspect, and size, and if adequate perennial plants exist, this change can occur more rapidly. This process will likely take a long period of time (25+ years). Range seeding with deferment and prescribed grazing can convert this to a plant community resembling the Big Bluestem/Switchgrass/Prairie Cordgrass Plant Community.

Conservation practices

Restoration pathway R3b State 3 to 2

Heavy, continuous grazing will lead this plant community towards the Kentucky Bluegrass Sod/Baltic Rush Plant Community.

Additional community tables

Table 9. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	Tall Warm-Season			1793–2242	
	big bluestem	ANGE	<i>Andropogon gerardii</i>	1569–2018	–
	switchgrass	PAVI2	<i>Panicum virgatum</i>	224–673	–
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	0–224	–
	Indiangrass	SONU2	<i>Sorghastrum nutans</i>	45–224	–
	prairie cordgrass	SPPE	<i>Spartina pectinata</i>	90–224	–
2	Mid Cool-Season			224–448	
	northern reedgrass	CASTI3	<i>Calamagrostis stricta</i> ssp. <i>inexpansa</i>	135–224	–
	porcupinegrass	HESP11	<i>Hesperostipa spartea</i>	0–135	–
	green needlegrass	NAVI4	<i>Nassella viridula</i>	0–135	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	90–135	–
3	Other Native Grasses			135–224	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–90	–
	Canada wildrye	ELCA4	<i>Elymus canadensis</i>	45–90	–
	slender wheatgrass	ELTRS	<i>Elymus trachycaulus</i> ssp. <i>subsecundus</i>	45–90	–
	slender wheatgrass	ELTRT	<i>Elymus trachycaulus</i> ssp. <i>trachycaulus</i>	45–90	–
	mat muhly	MURI	<i>Muhlenbergia richardsonis</i>	0–90	–
	fowl bluegrass	POPA2	<i>Poa palustris</i>	45–90	–
4	Grass-Likes			135–224	
	Pennsylvania sedge	CAPE6	<i>Carex pensylvanica</i>	90–135	–
	common spikerush	ELPA3	<i>Eleocharis palustris</i>	45–90	–
	Grass-like (not a true grass)	2GL	<i>Grass-like (not a true grass)</i>	45–90	–
	shortbeak sedge	CABR10	<i>Carex brevior</i>	45–90	–
	woolly sedge	CAPE42	<i>Carex pellita</i>	45–90	–
Forb					
6	Forbs			224–448	
	Canada goldenrod	SOCA6	<i>Solidago canadensis</i>	45–90	–
	white prairie aster	SYFA	<i>Symphotrichum falcatum</i>	45–90	–
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–90	–
	common yarrow	ACMI2	<i>Achillea millefolium</i>	45–90	–

	Common yellow	ROM2	<i>Rumex crispus</i>	45-90	-
	American licorice	GLLE3	<i>Glycyrrhiza lepidota</i>	45-90	-
	Maximilian sunflower	HEMA2	<i>Helianthus maximiliani</i>	45-90	-
	mint	MENTH	<i>Mentha</i>	45-90	-
	meadow zizia	ZIAP	<i>Zizia aptera</i>	45-90	-
	catnip	NECA2	<i>Nepeta cataria</i>	0-45	-
	cinquefoil	POTEN	<i>Potentilla</i>	0-45	-
	wood lily	LIPH	<i>Lilium philadelphicum</i>	0-45	-
	anemone	ANEMO	<i>Anemone</i>	0-45	-
	dogbane	APOCY	<i>Apocynum</i>	0-45	-
	Flodman's thistle	CIFL	<i>Cirsium flodmanii</i>	0-45	-
	northern bedstraw	GABO2	<i>Galium boreale</i>	0-45	-
	downy gentian	GEPUS	<i>Gentiana puberulenta</i>	0-45	-
	American vetch	VIAM	<i>Vicia americana</i>	0-45	-
Shrub/Vine					
7	Shrubs			224-448	
	willow	SALIX	<i>Salix</i>	90-224	-
	western snowberry	SYOC	<i>Symphoricarpos occidentalis</i>	179-224	-
	silver buffaloberry	SHAR	<i>Shepherdia argentea</i>	90-179	-
	hawthorn	CRATA	<i>Crataegus</i>	45-135	-
	chokecherry	PRVI	<i>Prunus virginiana</i>	90-135	-
	Saskatoon serviceberry	AMAL2	<i>Amelanchier alnifolia</i>	90-135	-
	dwarf false indigo	AMNA	<i>Amorpha nana</i>	45-90	-
	redosier dogwood	COSE16	<i>Cornus sericea</i>	45-90	-
	Missouri gooseberry	RIMI	<i>Ribes missouriense</i>	45-90	-
	prairie rose	ROAR3	<i>Rosa arkansana</i>	45-90	-
	American plum	PRAM	<i>Prunus americana</i>	0-45	-
	western poison ivy	TORY	<i>Toxicodendron rydbergii</i>	0-45	-
	Subshrub (<.5m)	2SUBS	<i>Subshrub (<.5m)</i>	0-45	-
Tree					
8	Trees			224-448	
	Tree	2TREE	<i>Tree</i>	0-135	-
	green ash	FRPE	<i>Fraxinus pennsylvanica</i>	45-135	-
	plains cottonwood	PODEM	<i>Populus deltoides ssp. monilifera</i>	0-135	-
	peachleaf willow	SAAM2	<i>Salix amygdaloides</i>	45-135	-
	boxelder	ACNE2	<i>Acer negundo</i>	0-45	-

Table 10. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	Tall Warm-Season			101-168	
	big bluestem	ANGE	<i>Andropogon gerardii</i>	67-168	-
	switchgrass	PAV12	<i>Panicum virgatum</i>	0-34	-
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	0-34	-

2	Mid Cool-Season			504–673	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	504–673	–
	green needlegrass	NAVI4	<i>Nassella viridula</i>	34–67	–
	porcupinegrass	HESP11	<i>Hesperostipa spartea</i>	0–34	–
3	Other Native Grasses			101–168	
	fowl bluegrass	POPA2	<i>Poa palustris</i>	67–135	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	34–67	–
	Fendler threeawn	ARPUL	<i>Aristida purpurea var. longiseta</i>	34–67	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	34–67	–
	mat muhly	MURI	<i>Muhlenbergia richardsonis</i>	34–67	–
	slender wheatgrass	ELTRS	<i>Elymus trachycaulus ssp. subsecundus</i>	0–34	–
	slender wheatgrass	ELTRT	<i>Elymus trachycaulus ssp. trachycaulus</i>	0–34	–
4	Grass-Likes			168–336	
	common spikerush	ELPA3	<i>Eleocharis palustris</i>	101–168	–
	Grass-like (not a true grass)	2GL	<i>Grass-like (not a true grass)</i>	34–67	–
	shortbeak sedge	CABR10	<i>Carex brevior</i>	0–34	–
	woolly sedge	CAPE42	<i>Carex pellita</i>	0–34	–
	Pennsylvania sedge	CAPE6	<i>Carex pensylvanica</i>	0–34	–
5	Non-Native Grasses			841–1177	
	Kentucky bluegrass	POPR	<i>Poa pratensis</i>	336–1009	–
	smooth brome	BRIN2	<i>Bromus inermis</i>	0–841	–
	bluegrass	POA	<i>Poa</i>	0–168	–
	cheatgrass	BRTE	<i>Bromus tectorum</i>	0–67	–
Forb					
6	Forbs			269–437	
	Canada thistle	CIAR4	<i>Cirsium arvense</i>	0–336	–
	sweetclover	MELIL	<i>Melilotus</i>	34–336	–
	Forb (herbaceous, not grass nor grass-like)	2FORB	<i>Forb (herbaceous, not grass nor grass-like)</i>	0–168	–
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	101–168	–
	cocklebur	XANTH2	<i>Xanthium</i>	0–168	–
	Canada goldenrod	SOCA6	<i>Solidago canadensis</i>	67–101	–
	white heath aster	SYER	<i>Symphotrichum ericoides</i>	67–101	–
	common dandelion	TAOF	<i>Taraxacum officinale</i>	67–101	–
	common yarrow	ACMI2	<i>Achillea millefolium</i>	67–101	–
	Flodman's thistle	CIFL	<i>Cirsium flodmanii</i>	67–101	–
	wavyleaf thistle	CIUN	<i>Cirsium undulatum</i>	67–101	–
	dogbane	APOCY	<i>Apocynum</i>	67–101	–
	curlycup gumweed	GRSQ	<i>Grindelia squarrosa</i>	34–67	–
	black medick	MELU	<i>Medicago lupulina</i>	34–67	–
	catnip	NECA2	<i>Nepeta cataria</i>	34–67	–
	cinquefoil	POTEN	<i>Potentilla</i>	34–67	–
	northern bedstraw	GABO2	<i>Galium boreale</i>	34–67	–

	Forb, perennial	2FP	<i>Forb, perennial</i>	0–67	–
	yellow salsify	TRDU	<i>Tragopogon dubius</i>	34–67	–
	white prairie aster	SYFA	<i>Symphotrichum falcatum</i>	34–67	–
	anemone	ANEMO	<i>Anemone</i>	0–34	–
	American licorice	GLLE3	<i>Glycyrrhiza lepidota</i>	0–34	–
	mint	MENTH	<i>Mentha</i>	0–34	–
	wood lily	LIPH	<i>Lilium philadelphicum</i>	0–34	–
	Forb, annual	2FA	<i>Forb, annual</i>	0–34	–
Shrub/Vine					
7	Shrubs			34–67	
	silver buffaloberry	SHAR	<i>Shepherdia argentea</i>	67–101	–
	western snowberry	SYOC	<i>Symphoricarpos occidentalis</i>	34–67	–
	western poison ivy	TORY	<i>Toxicodendron rydbergii</i>	34–67	–
	Subshrub (<.5m)	2SUBS	<i>Subshrub (<.5m)</i>	0–34	–
	prairie rose	ROAR3	<i>Rosa arkansana</i>	0–34	–
	willow	SALIX	<i>Salix</i>	0–34	–
Tree					
9	Trees			168–336	
	Tree	2TREE	<i>Tree</i>	0–168	–
	boxelder	ACNE2	<i>Acer negundo</i>	0–67	–
	green ash	FRPE	<i>Fraxinus pennsylvanica</i>	0–67	–
	plains cottonwood	PODEM	<i>Populus deltoides ssp. monilifera</i>	0–67	–
	peachleaf willow	SAAM2	<i>Salix amygdaloides</i>	0–67	–

Table 11. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	Tall Warm-Season			67–101	
	big bluestem	ANGE	<i>Andropogon gerardii</i>	67–101	–
	switchgrass	PAVI2	<i>Panicum virgatum</i>	0–34	–
	little bluestem	SCSC	<i>Schizachyrium scoparium</i>	0–34	–
	prairie cordgrass	SPPE	<i>Spartina pectinata</i>	0–34	–
2	Mid Cool-Season			101–135	
	green needlegrass	NAVI4	<i>Nassella viridula</i>	34–135	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	67–135	–
	northern reedgrass	CASTI3	<i>Calamagrostis stricta ssp. inexpansa</i>	0–34	–
	porcupinegrass	HESP11	<i>Hesperostipa spartea</i>	0–34	–
3	Other Native Grasses			135–269	
	fowl bluegrass	POPA2	<i>Poa palustris</i>	135–269	–
	slender wheatgrass	ELTRS	<i>Elymus trachycaulus ssp. subsecundus</i>	34–67	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	34–67	–
	mat muhly	MURI	<i>Muhlenbergia richardsonis</i>	0–34	–

	slender wheatgrass	ELTRT	<i>Elymus trachycaulus</i> ssp. <i>trachycaulus</i>	0–34	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–34	–
	Fendler threeawn	ARPUL	<i>Aristida purpurea</i> var. <i>longiseta</i>	0–34	–
	Canada wildrye	ELCA4	<i>Elymus canadensis</i>	0–34	–
4	Grass-Likes			101–168	
	Pennsylvania sedge	CAPE6	<i>Carex pensylvanica</i>	101–168	–
	common spikerush	ELPA3	<i>Eleocharis palustris</i>	34–67	–
	shortbeak sedge	CABR10	<i>Carex brevior</i>	34–67	–
	woolly sedge	CAPE42	<i>Carex pellita</i>	34–67	–
	Grass-like (not a true grass)	2GL	<i>Grass-like (not a true grass)</i>	0–34	–
5	Non-Native Grasses			1009–1177	
	Kentucky bluegrass	POPR	<i>Poa pratensis</i>	336–1177	–
	smooth brome	BRIN2	<i>Bromus inermis</i>	0–673	–
	bluegrass	POA	<i>Poa</i>	0–504	–
	cheatgrass	BRTE	<i>Bromus tectorum</i>	0–168	–
Forb					
6	Forbs			168–336	
	Canada thistle	CIAR4	<i>Cirsium arvense</i>	0–235	–
	sweetclover	MELIL	<i>Melilotus</i>	34–235	–
	Canada goldenrod	SOCA6	<i>Solidago canadensis</i>	67–168	–
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	67–101	–
	American licorice	GLLE3	<i>Glycyrrhiza lepidota</i>	67–101	–
	black medick	MELU	<i>Medicago lupulina</i>	34–67	–
	mint	MENTH	<i>Mentha</i>	34–67	–
	catnip	NECA2	<i>Nepeta cataria</i>	34–67	–
	cinquefoil	POTEN	<i>Potentilla</i>	34–67	–
	Flodman's thistle	CIFL	<i>Cirsium flodmanii</i>	34–67	–
	wavyleaf thistle	CIUN	<i>Cirsium undulatum</i>	34–67	–
	northern bedstraw	GABO2	<i>Galium boreale</i>	34–67	–
	Forb (herbaceous, not grass nor grass-like)	2FORB	<i>Forb (herbaceous, not grass nor grass-like)</i>	34–67	–
	common yarrow	ACMI2	<i>Achillea millefolium</i>	34–67	–
	anemone	ANEMO	<i>Anemone</i>	34–67	–
	dogbane	APOCY	<i>Apocynum</i>	34–67	–
	white heath aster	SYER	<i>Symphotrichum ericoides</i>	34–67	–
	Maximilian sunflower	HEMA2	<i>Helianthus maximiliani</i>	34–67	–
	common dandelion	TAOF	<i>Taraxacum officinale</i>	34–67	–
	yellow salsify	TRDU	<i>Tragopogon dubius</i>	34–67	–
	American vetch	VIAM	<i>Vicia americana</i>	0–34	–
	cocklebur	XANTH2	<i>Xanthium</i>	0–34	–
	meadow zizia	ZIAP	<i>Zizia aptera</i>	0–34	–
	wood lily	LIPH	<i>Lilium philadelphicum</i>	0–34	–
	white prairie aster	SYFA	<i>Symphotrichum falcatum</i>	0–34	–

	Forb, perennial	2FP	<i>Forb, perennial</i>	0–34	–
	downy gentian	GEPU5	<i>Gentiana puberulenta</i>	0–34	–
	curlycup gumweed	GRSQ	<i>Grindelia squarrosa</i>	0–34	–
	Forb, annual	2FA	<i>Forb, annual</i>	0–34	–
Shrub/Vine					
7	Shrubs			336–504	
	willow	SALIX	<i>Salix</i>	67–336	–
	silver buffaloberry	SHAR	<i>Shepherdia argentea</i>	67–336	–
	western snowberry	SYOC	<i>Symphoricarpos occidentalis</i>	67–336	–
	hawthorn	CRATA	<i>Crataegus</i>	101–168	–
	chokecherry	PRVI	<i>Prunus virginiana</i>	101–168	–
	prairie rose	ROAR3	<i>Rosa arkansana</i>	67–101	–
	American plum	PRAM	<i>Prunus americana</i>	67–101	–
	redosier dogwood	COSE16	<i>Cornus sericea</i>	34–101	–
	Saskatoon serviceberry	AMAL2	<i>Amelanchier alnifolia</i>	67–101	–
	dwarf false indigo	AMNA	<i>Amorpha nana</i>	34–67	–
	western poison ivy	TORY	<i>Toxicodendron rydbergii</i>	34–67	–
	Missouri gooseberry	RIMI	<i>Ribes missouriense</i>	34–67	–
	Subshrub (<.5m)	2SUBS	<i>Subshrub (<.5m)</i>	0–34	–
Tree					
8	Trees			336–673	
	green ash	FRPE	<i>Fraxinus pennsylvanica</i>	101–336	–
	plains cottonwood	PODEM	<i>Populus deltoides ssp. monilifera</i>	0–336	–
	peachleaf willow	SAAM2	<i>Salix amygdaloides</i>	101–168	–
	Tree	2TREE	<i>Tree</i>	0–168	–
	boxelder	ACNE2	<i>Acer negundo</i>	0–168	–

Table 12. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	Tall Warm-Season			0–67	
	big bluestem	ANGE	<i>Andropogon gerardii</i>	22–67	–
	switchgrass	PAVI2	<i>Panicum virgatum</i>	0–22	–
2	Mid Cool-Season			112–224	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	112–224	–
3	Other Native Grasses			112–224	
	fowl bluegrass	POPA2	<i>Poa palustris</i>	112–224	–
	Fendler threeawn	ARPUL	<i>Aristida purpurea var. longiseta</i>	45–67	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	45–67	–
	mat muhly	MURI	<i>Muhlenbergia richardsonis</i>	45–67	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–22	–
4	Grass-Likes			224–336	
	common spikerush	ELPA3	<i>Eleocharis palustris</i>	11–179	–
	Grass like (not a true grass)	2GL	<i>Grass like (not a true grass)</i>	0–22	–

	Grass-like (not a true grass)	ZGL	Grass-like (not a true grass)	0-22	-
	shortbeak sedge	CABR10	<i>Carex brevior</i>	0-22	-
5	Non-Native Grasses			673-897	
	Kentucky bluegrass	POPR	<i>Poa pratensis</i>	224-785	-
	smooth brome	BRIN2	<i>Bromus inermis</i>	0-560	-
	bluegrass	POA	<i>Poa</i>	0-112	-
	cheatgrass	BRTE	<i>Bromus tectorum</i>	0-45	-
Forb					
6	Forbs			224-336	
	cocklebur	XANTH2	<i>Xanthium</i>	0-224	-
	Forb (herbaceous, not grass nor grass-like)	2FORB	<i>Forb (herbaceous, not grass nor grass-like)</i>	22-224	-
	Canada thistle	CIAR4	<i>Cirsium arvense</i>	0-224	-
	sweetclover	MELIL	<i>Melilotus</i>	45-224	-
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	112-179	-
	Canada goldenrod	SOCA6	<i>Solidago canadensis</i>	67-112	-
	white heath aster	SYER	<i>Symphotrichum ericoides</i>	67-112	-
	common dandelion	TAOF	<i>Taraxacum officinale</i>	67-90	-
	Flodman's thistle	CIFL	<i>Cirsium flodmanii</i>	67-90	-
	wavyleaf thistle	CIUN	<i>Cirsium undulatum</i>	67-90	-
	common yarrow	ACMI2	<i>Achillea millefolium</i>	67-90	-
	dogbane	APOCY	<i>Apocynum</i>	45-67	-
	northern bedstraw	GABO2	<i>Galium boreale</i>	45-67	-
	curlycup gumweed	GRSQ	<i>Grindelia squarrosa</i>	45-67	-
	yellow salsify	TRDU	<i>Tragopogon dubius</i>	45-67	-
	Forb, annual	2FA	<i>Forb, annual</i>	45-67	-
	black medick	MELU	<i>Medicago lupulina</i>	22-45	-
	cinquefoil	POTEN	<i>Potentilla</i>	22-45	-
	white prairie aster	SYFA	<i>Symphotrichum falcatum</i>	22-45	-
	Forb, perennial	2FP	<i>Forb, perennial</i>	0-22	-
Shrub/Vine					
7	Shrubs			0-45	
	silver buffaloberry	SHAR	<i>Shepherdia argentea</i>	22-45	-
	western snowberry	SYOC	<i>Symphoricarpos occidentalis</i>	0-45	-
	Subshrub (<.5m)	2SUBS	<i>Subshrub (<.5m)</i>	0-22	-
	prairie rose	ROAR3	<i>Rosa arkansana</i>	0-22	-
Tree					
8	Trees			67-112	
	Tree	2TREE	<i>Tree</i>	0-90	-
	boxelder	ACNE2	<i>Acer negundo</i>	0-22	-
	green ash	FRPE	<i>Fraxinus pennsylvanica</i>	0-22	-
	plains cottonwood	PODEM	<i>Populus deltoides ssp. monilifera</i>	0-22	-
	peachleaf willow	SAAM2	<i>Salix amygdaloides</i>	0-22	-

Hydrological functions

Water is not a principal factor limiting herbage production on this site. The site is dominated by soils in hydrologic groups D and B. Infiltration varies from moderately rapid to moderate, and runoff potential varies from negligible to very low depending on soil hydrologic group and ground cover. 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 variety of plants which bloom from spring until fall have an esthetic value that appeals to visitors.

Wood products

This site has potential for wood products from trees and shrubs.

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. 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; Stan Boltz, NRCS Range Management Specialist; Darrell Vanderbusch, NRCS Resource Soil Scientist; L. Michael Stirling, NRCS Range Management Specialist; Royal Handegard, NRCS Soil Conservationist; Josh Saunders, NRCS Range Management Specialist; Jody Forman, NRCS Grazing Land Management Specialist; David Dewald, NRCS State Biologist; and Brad Podoll, NRCS Biologist.

Data Source Number of Records Sample Period State County

Ocular Estimates 2 2001 ND Grant

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

Jeff Printz/Stan Boltz

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 701-530-2080
Date	05/24/2011
Approved by	
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 5%.

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 95% 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 and slow overland flow, providing increased time for infiltration to occur. 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, rhizomatous warm-season grass >

Sub-dominant: mid, cool-season bunchgrasses >

Other: mid, cool-season rhizomatous grasses > forbs = shrubs = trees > grass-like

Additional: Due to differing root structure and distribution, Kentucky bluegrass and smooth brome grass 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 = 4000 lbs/ac with a range of 3300 lbs/ac to 4700 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, smooth brome grass, Kentucky bluegrass, Russian olive
-

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