USDA Natural Resources Conservation Service

Ecological site R053BY001ND
Clayey

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General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

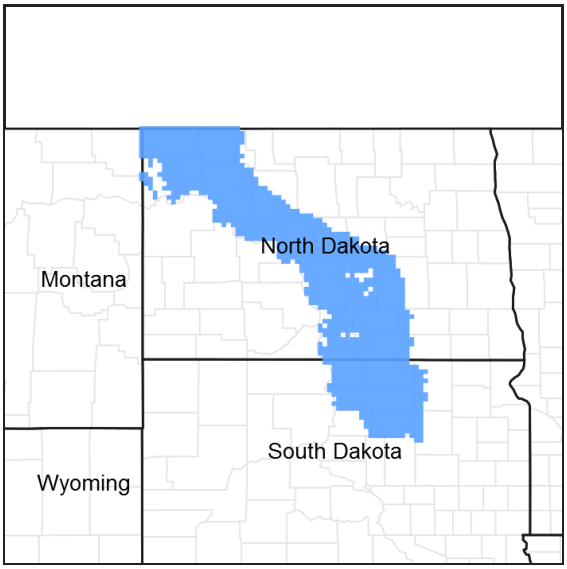


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

Classification relationships

Level IV Ecoregions of the Conterminous United States: 42a – Missouri Coteau; 42b – Collapsed Glacial Outwash; 42c – Missouri Coteau Slope; 42d – Northern Missouri Coteau; 42f – Southern Missouri Coteau Slope; 42g – Ponca Plains; and 42h – Southern River Breaks.

Associated sites

R053BY002ND	**Claypan**
R053BY003ND	**Closed Depression**
R053BY005ND	**Loamy Overflow**
R053BY011ND	**Loamy**
R053BY013ND	**Thin Claypan**

Similar sites

R053BY002ND	**Claypan** [Well drained soils on uplands or terraces that don't receive extra moisture with a dense sodic subsoil below 6 inches with salts below 16 inches; indicator species are western wheatgrass with an understory of blue grama, heath aster, and western yarrow along with a few shrub species such as fringed sagewort and brittle cactus; typically has more blue grama and lower production.]
R054XY031ND	**Loamy** [Similar landscape position. Will ribbon greater than 1 inch and up to 2 inches. Indicator species are western wheatgrass and needleandthread, with some green needlegrass and blue grama, and with fringed sagewort and western snowberry being the dominant shrubs. This site has less green needlegrass and slightly higher production, and less clayey soils.]

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Pascopyrum smithii* (2) *Nassella viridula*

Physiographic features

This site occurs on gently undulating to hilly, nearly level to moderately steep uplands.

Table 2. Representative physiographic features

Landforms	(1) Lake plain (2) Till plain (3) Flat
Flooding frequency	None
Ponding frequency	None
Elevation	1,600–2,000 ft
Slope	1–9%
Water table depth	42–80 in
Aspect	Aspect is not a significant factor

Climatic features

MLRA 53B 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 15 to 20 inches per year. The normal average annual temperature is about 41° F. January is the coldest month with average temperatures ranging from about 4° F (Powers Lake, ND) to about 10° F (Pollock, SD). July is the warmest month with temperatures averaging from about 67° F (Powers Lake, ND) to about 72° F (Pollock, SD). The range of normal average monthly temperatures between the coldest and warmest months is about 62° F. This large annual range attests to the continental nature of this MLRA's climate. Winds 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 (characteristic range)	88-117 days
Freeze-free period (characteristic range)	115-135 days
Precipitation total (characteristic range)	15-20 in
Frost-free period (actual range)	84-120 days
Freeze-free period (actual range)	109-136 days
Precipitation total (actual range)	15-21 in
Frost-free period (average)	102 days
Freeze-free period (average)	125 days
Precipitation total (average)	18 in

Climate stations used

- (1) GARRISON [USW00094041], Garrison, ND
- (2) WILDROSE 3NW [USC00329400], Wildrose, ND
- (3) TIOGA 1E [USC00328737], Tioga, ND
- (4) POWERS LAKE 1N [USC00327281], Powers Lake, ND
- (5) ROSCOE [USC00397277], Roscoe, SD
- (6) GACKLE [USC00323309], Gackle, ND
- (7) WILTON [USC00329455], Wilton, ND
- (8) SELBY [USC00397545], Selby, SD

Influencing water features

No significant water features influence this site.

Soil features

These are moderately deep to very deep, moderately well and well drained, moderately fine and fine textured soils. Saturated hydraulic conductivity is slow or very slow and available water capacity is moderate to high. Salinity is none to very slight and sodicity is none to high at depths greater than 16 inches. Slope ranges from 1 to 9 percent. When dry these soils crack. When the soils are wet, surface compaction can occur with heavy traffic. This site should show slight to no evidence of rills, wind scoured areas or pedestalled plants. Water flow paths are broken, irregular in appearance or discontinuous. The soil surface is stable and intact. Sub-surface soil layers are non-restrictive to water movement and root penetration.

These soils are mainly susceptible to water erosion. The hazard of water erosion increases on slopes greater than about 5 percent. Loss of the soil surface layer can result in a shift in species composition and/or production.

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 site:
http://www.nrcs.usda.gov/technical/efotg/

Table 4. Representative soil features

Surface texture	(1) Silt loam (2) Silty clay loam (3) Loam
Family particle size	(1) Clayey
Drainage class	Moderately well drained to well drained
Permeability class	Very slow to slow
Soil depth	20–80 in

Surface fragment cover <=3"	0–10%
Surface fragment cover >3"	0–5%
Available water capacity (0-40in)	5–7 in
Calcium carbonate equivalent (0-40in)	0–15%
Electrical conductivity (0-40in)	0–4 mmhos/cm
Sodium adsorption ratio (0-40in)	0–15
Soil reaction (1:1 water) (0-40in)	6.1–8.5
Subsurface fragment volume <=3" (Depth not specified)	0–20%
Subsurface fragment volume >3" (Depth not specified)	0–5%

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 management actions and/or climatic conditions. Due to the nature of the soils, the site is considered moderately resilient. Under continued adverse impacts, a moderate decline in vegetative vigor and composition will occur. Under favorable vegetative management treatments the site can readily return to the Historic Climax Plant Community (HCPC).

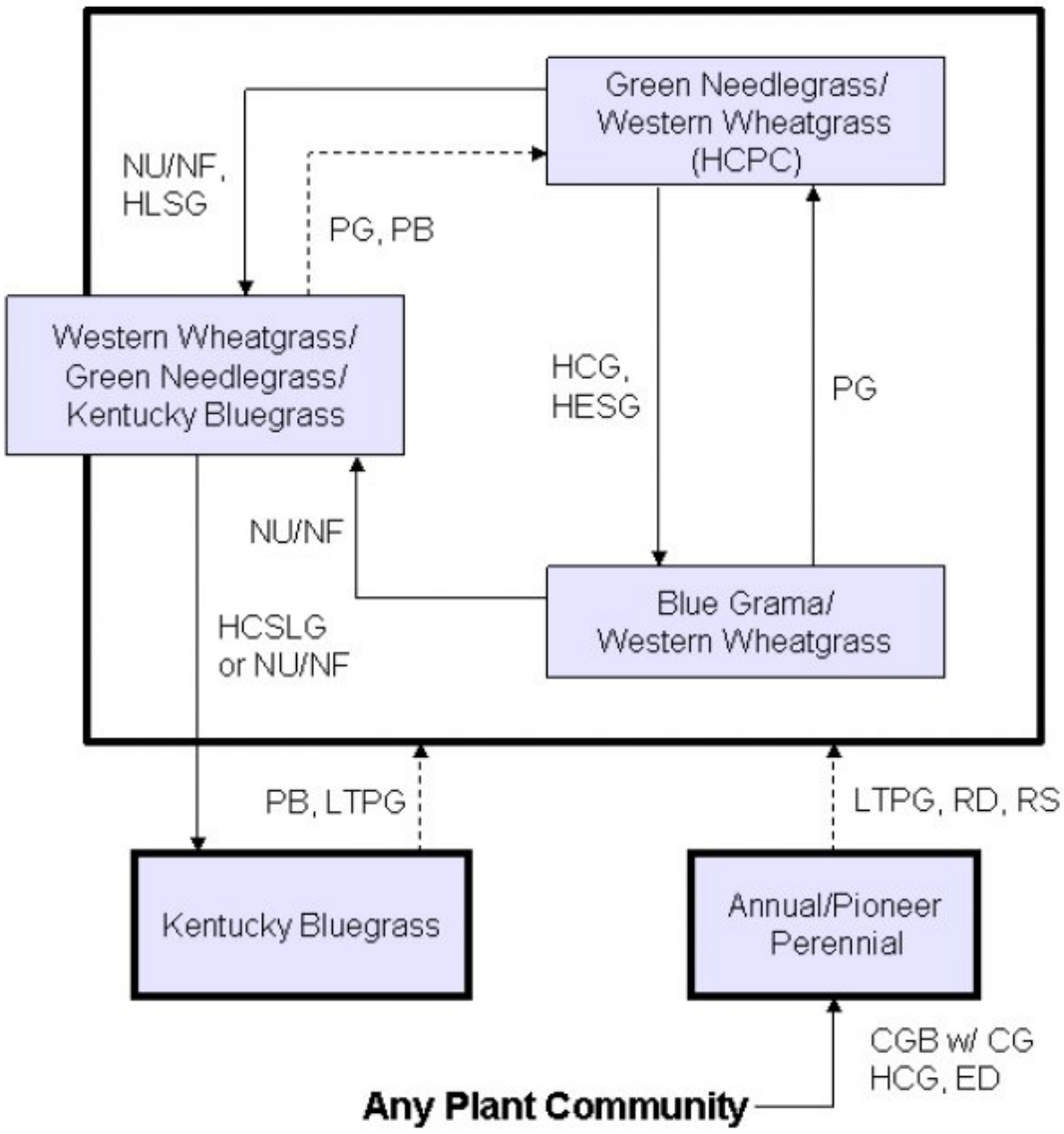
The plant community upon which interpretations are primarily based is the Historic Climax Plant Community. The HCPC has been determined by study of rangeland relic areas, areas protected from excessive disturbance, and areas under long-term rotational grazing regimes. Trends in plant community dynamics 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.

Heavy continuous grazing and/or continuous seasonal (spring) grazing, without adequate recovery periods following each grazing occurrence causes this site to depart from the HCPC. Blue grama and buffalograss will begin to increase. Western wheatgrass will increase initially and then begin to decrease. Green needlegrass will decrease in frequency and production. In time, heavy continuous grazing will likely cause blue grama and buffalograss to dominate and pioneer perennials and annuals to increase. This plant community is relatively stable and the competitive advantage prevents other species from establishing. This plant community is less productive than the HCPC. Runoff increases and infiltration will decrease. Soil erosion will be minimal.

Extended periods of non-use and/or lack of fire will result in a plant community having high litter levels, which favors an increase in Kentucky bluegrass and/or smooth bromegrass.

The following is a diagram that illustrates the common plant communities that can occur on the site and the transition pathways between communities. The ecological processes will be discussed in more detail in the plant community descriptions following the diagram.

State and transition model



CGB w/ CG – Cropped go-back with continuous grazing; **ED** – Excessive defoliation; **HCG** – Heavy continuous grazing; **HCPC** – Historic Climax Plant Community; **HCSLG** – Heavy continuous season-long grazing; **HESG** – Heavy, early seasonal grazing; **HLSG** – Heavy, late seasonal grazing; **LTPG** – Long-term prescribed grazing; **NU/NF** – Extended period of non-use & no fire; **PB** – Prescribed burning, followed by prescribed grazing; **PG** – Prescribed grazing; **RD** – Removal of disturbance; **RS** – Range seeding with prescribed grazing.

State 1
Green Needlegrass/Western Wheatgrass (HCPC)

Community 1.1
Green Needlegrass/Western Wheatgrass (HCPC)

This is the interpretive plant community and is considered to be the Historic Climax Plant Community (HCPC). This community evolved with grazing by large herbivores and occasional prairie fires and can be found on areas that are properly managed with grazing and/or prescribed burning, and sometimes on areas receiving occasional short periods of rest. The potential vegetation is about 90% grasses or grass-like plants, 5% forbs, and 5% shrubs. Green needlegrass and western wheatgrass dominate the plant community. Other grasses and grass-like plants include thickspike wheatgrass, blue grama, porcupine grass, buffalograss, prairie junegrass, and sedges. Significant forbs include scurfpea, Lambert crazyweed, scarlet globemallow, cudweed sagewort and western yarrow. In many areas western snowberry is the principal shrub and occurs in patchy mosaics. Other shrubs include prairie rose, plains pricklypear and fringed sagewort. This plant community is well adapted to the Northern Great Plains climatic conditions. Individual species can vary greatly in production depending on growing conditions (timing and amount of precipitation and temperature). Community dynamics, nutrient cycle, water cycle and energy flow are functioning properly. Plant litter is properly distributed with very little movement off-site and natural plant mortality is very low. The diversity in plant species allows for high drought tolerance. Run-off from adjacent sites and moderate or high available water capacity provides a favorable soil-water-plant relationship. Transitional pathways and/or community pathways leading to other plant communities are as follows: • Non-use and no fire for extended periods of time will convert this plant community to the Western Wheatgrass/Green Needlegrass/Kentucky Bluegrass Plant Community. • Heavy, late seasonal grazing will convert the plant community to the Western Wheatgrass/Green Needlegrass/Kentucky Bluegrass Plant Community. • Heavy, continuous grazing or heavy, early seasonal grazing will convert the plant community to the Blue Grama/Western Wheatgrass Plant Community. • Excessive defoliation (i.e., areas of heavy animal concentration) will convert the plant community to the Annual/Pioneer Perennial Plant Community. • Cropped go-back land with continuous grazing will convert this plant community to the Annual/Pioneer Perennial Plant Community.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1235	2174	2910
Forb	45	80	120
Shrub/Vine	20	46	70
Total	**1300**	**2300**	**3100**

Figure 9. Plant community growth curve (percent production by month). ND5301, Missouri Coteau, cool-season dominant.. Cool-season dominant..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	8	24	45	10	3	5	2	0	0

State 2
Blue Grama/ Western Wheatgrass

Community 2.1
Blue Grama/ Western Wheatgrass

This plant community is the result of heavy, continuous grazing and/or annual, early spring seasonal grazing. Repeated spring grazing depletes stored carbohydrates, resulting in weakening and eventual death of the cool season mid-grasses. Blue grama and western wheatgrass are the dominant species with the balance being a few species of cool-season grasses/grass-likes and warm-season grasses including upland sedges, needleandthread, prairie junegrass and annual grasses. Forbs such as scurfpea, cudweed sagewort and scarlet globemallow may also be present. This plant community can occur throughout the pasture, on spot grazed areas, and around water sources where season-long grazing patterns occur. This plant community is less productive than the HCPC. Lack of litter and reduced plant vigor result in higher soil temperatures, poor water infiltration rates, and high evapotranspiration, which gives blue grama a competitive advantage over cool season mid-grasses. Transitional

pathways and/or community pathways leading to other plant communities are as follows: • Heavy, continuous grazing and/or excessive defoliation may cause further deterioration resulting in a shift to the Annual/Pioneer Perennial Plant Community. • Non-use and no fire over an extended period of time may lead this plant community to the Western Wheatgrass/Green Needlegrass/Kentucky Bluegrass Plant Community. This shift may take considerably longer than the corresponding transition from HCPC, depending on how much residual cool-season mid-grasses are present upon initiation of non-use or fire exclusion. • Cropped go-back land with continuous grazing will convert this plant community to the Annual/Pioneer Perennial Plant Community. • Prescribed grazing that includes changing season of use and allowing adequate recovery periods between grazing events will lead this plant community back to the Green Needlegrass/Western Wheatgrass Plant Community (HCPC).

Table 6. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	635	1074	1510
Forb	55	90	125
Shrub/Vine	10	36	65
Total	**700**	**1200**	**1700**

Figure 11. Plant community growth curve (percent production by month). ND5304, Missouri Coteau, warm-season dominant, cool-season sub-dominant.. Warm-season dominant, cool-season sub-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

State 3
Western Wheatgrass/Green Needlegrass/Kentucky Bluegrass

Community 3.1
Western Wheatgrass/Green Needlegrass/Kentucky Bluegrass

This plant community develops after an extended period of non-use by herbivores and exclusion of fire, or with heavy, late seasonal grazing each year. Western wheatgrass and green needlegrass typically dominate the plant community, but non-native grasses, such as Kentucky bluegrass, smooth bromegrass and crested wheatgrass tend to invade and may become prevalent. If the non-native grasses become well established, this plant community will likely cross an ecological threshold, and return to the HCPC will become difficult. Other grasses present include porcupine grass, needleandthread, prairie junegrass and blue grama. The common forbs include scurfpea, cudweed sagewort and western yarrow. Western snowberry and/or fringed sagewort are the principal shrubs and tend to increase in density and cover. Litter buildup reduces plant vigor and density, and native seedling recruitment declines. Due to a lack of tiller stimulation and sunlight, native bunchgrasses typically develop dead centers and native rhizomatous grasses are limited to small colonies. This plant community is often dispersed throughout the pasture, encircling spot grazed areas, and areas distant from water sources. This is a typical pattern found in properly stocked pastures grazed season-long. This plant community is resistant to change without prescribed grazing or fire. The combination of both grazing and fire is most effective in moving this plant community towards the HCPC. Soil erosion is low. Runoff is similar to the HCPC. Once this plant community is reached, time and external resources will be needed to see any recovery in diversity. Transitional pathways and/or community pathways leading to other plant communities are as follows: • Prescribed grazing or prescribed burning followed by prescribed grazing, may return this plant community to the Green Needlegrass/Western Wheatgrass Plant Community (HCPC). This would require long-term management with prescribed grazing and/or prescribed burning under controlled conditions. • Heavy, continuous season-long grazing or continued non-use and no fire will lead this plant community to the Kentucky Bluegrass Plant Community.

Table 7. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1350	1776	2400
Shrub/Vine	15	57	100
Forb	35	67	100
Total	**1400**	**1900**	**2600**

Figure 13. Plant community growth curve (percent production by month). ND5301, Missouri Coteau, cool-season dominant.. Cool-season dominant..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	8	24	45	10	3	5	2	0	0

State 4
Kentucky Bluegrass

Community 4.1
Kentucky Bluegrass

This plant community develops after an extended period of 10 or more years of non-use by herbivores or exclusion of fire. Non-native grasses, such as Kentucky bluegrass, smooth bromegrass and crested wheatgrass tend to invade and may dominate this plant community. Other grasses present include western wheatgrass, porcupine grass, and green needlegrass. The common forbs include sweetclover and cudweed sagewort. Western snowberry and/or fringed sagewort are the principal shrubs and tend to increase in density and cover. Litter buildup reduces plant vigor and density, and native seedling recruitment declines. Due to a lack of tiller stimulation and sunlight, native bunchgrasses typically develop dead centers and native rhizomatous grasses are limited to small colonies. This plant community is dispersed throughout the pasture, encircling spot grazed areas, and areas distant from water sources. This is a typical pattern found in properly stocked pastures grazed season-long. This plant community is resistant to change without prescribed grazing or fire. The combination of both grazing and fire is most effective in moving this plant community towards the HCPC. Soil erosion is low. Runoff is similar to the HCPC. Once this plant community is reached, time and external resources will be needed to see any recovery in diversity. Transitional pathways and/or community pathways leading to other plant communities are as follows: • Prescribed burning followed by prescribed grazing or long-term prescribed grazing may move this plant community toward the Green Needlegrass/Western Wheatgrass Plant Community (HCPC). This would require long-term management with prescribed grazing and/or prescribed burning under controlled conditions. Once the non-native grasses become well established, this transition will be unlikely to occur.

Table 8. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	1110	1432	1750
Forb	75	120	165
Shrub/Vine	15	48	85
Total	**1200**	**1600**	**2000**

Figure 15. Plant community growth curve (percent production by month). ND5301, Missouri Coteau, cool-season dominant.. Cool-season dominant..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	3	8	24	45	10	3	5	2	0	0

Additional community tables

Table 9. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Wheatgrass**			575–805	
	western wheatgrass	PASM	*Pascopyrum smithii*	575–805	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	0–230	–
2	**Needlegrass**			345–575	
	green needlegrass	NAVI4	*Nassella viridula*	230–575	–
	shortbristle needle and thread	HECU9	*Hesperostipa curtiseta*	0–345	–
	porcupinegrass	HESP11	*Hesperostipa spartea*	0–115	–
3	**Mid Warm-Season**			115–230	
	sideoats grama	BOCU	*Bouteloua curtipendula*	23–115	–
	plains muhly	MUCU3	*Muhlenbergia cuspidata*	0–115	–
	prairie dropseed	SPHE	*Sporobolus heterolepis*	23–115	–
4	**Short Warm-Season**			115–230	
	blue grama	BOGR2	*Bouteloua gracilis*	115–230	–
5	**Native Cool-Season**			23–138	
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	23–115	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	23–115	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	23–69	–
	plains reedgrass	CAMO	*Calamagrostis montanensis*	23–69	–
	sedge	CAREX	*Carex*	23–46	–
6	**Other Native Grasses**			23–138	
	Grass, perennial	2GP	*Grass, perennial*	23–115	–
	big bluestem	ANGE	*Andropogon gerardii*	0–115	–
	saltgrass	DISP	*Distichlis spicata*	0–23	–
Forb					
8	**Forbs**			46–115	
	white sagebrush	ARLU	*Artemisia ludoviciana*	23–69	–
	goldenrod	SOLID	*Solidago*	23–69	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	23–46	–
	white heath aster	SYER	*Symphyotrichum ericoides*	23–46	–
	leafy wildparsley	MUDI	*Musineon divaricatum*	23–46	–
	purple locoweed	OXLA3	*Oxytropis lambertii*	23–46	–
	scurfpea	PSORA2	*Psoralidium*	23–46	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	23–46	–
	milkvetch	ASTRA	*Astragalus*	0–46	–
	Forb, perennial	2FP	*Forb, perennial*	0–46	–
	western yarrow	ACMIO	*Achillea millefolium var. occidentalis*	23–46	–
	scarlet beeblossom	GACO5	*Gaura coccinea*	23–46	–
	blazing star	LIATR	*Liatris*	0–46	–
	desertparsley	LOMAT	*Lomatium*	23	–
	Forb, annual	2FA	*Forb, annual*	0–23	–

	Forb, annual	2FA	Forb, annual	0–23	
	autumn onion	ALST	*Allium stellatum*	23	–
	pussytoes	ANTEN	*Antennaria*	0–23	–
	false boneset	BREU	*Brickellia eupatorioides*	23	–
	wavyleaf thistle	CIUN	*Cirsium undulatum*	23	–
	prairie clover	DALEA	*Dalea*	0–23	–
	white prairie aster	SYFA	*Symphyotrichum falcatum*	0–23	–
	American vetch	VIAM	*Vicia americana*	23	–
Shrub/Vine					
9	**Shrubs**			23–69	
	prairie sagewort	ARFR4	*Artemisia frigida*	23–46	–
	prairie rose	ROAR3	*Rosa arkansana*	23–46	–
	western snowberry	SYOC	*Symphoricarpos occidentalis*	23–46	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–23	–
	Subshrub (<.5m)	2SUBS	*Subshrub (<.5m)*	0–23	–

Table 10. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Wheatgrass**			60–240	
	western wheatgrass	PASM	*Pascopyrum smithii*	60–240	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	0–60	–
2	**Needlegrass**			0–96	
	shortbristle needle and thread	HECU9	*Hesperostipa curtiseta*	0–96	–
	green needlegrass	NAVI4	*Nassella viridula*	0–96	–
3	**Mid Warm-Season**			0–36	
	sideoats grama	BOCU	*Bouteloua curtipendula*	0–36	–
	plains muhly	MUCU3	*Muhlenbergia cuspidata*	0–36	–
4	**Short Warm-Season**			240–480	
	blue grama	BOGR2	*Bouteloua gracilis*	120–480	–
	threeawn	ARIST	*Aristida*	0–180	–
5	**Native Cool-Season**			36–72	
	sedge	CAREX	*Carex*	24–60	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	12–36	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	0–12	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	0–12	–
6	**Other Native Grasses**			0–36	
	Grass, perennial	2GP	*Grass, perennial*	0–36	–
	saltgrass	DISP	*Distichlis spicata*	0–24	–
7	**Non-Native Grasses**			0–60	
	smooth brome	BRIN2	*Bromus inermis*	0–60	–
	cheatgrass	BRTE	*Bromus tectorum*	0–60	–
	bluegrass	POA	*Poa*	0–60	–

	crested wheatgrass	AGCR	*Agropyron cristatum*	0–24	–
Forb					
8	**Forbs**			60–120	
	sweetclover	MELIL	*Melilotus*	0–96	–
	Forb, annual	2FA	*Forb, annual*	0–60	–
	Forb, perennial	2FP	*Forb, perennial*	0–60	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	12–48	–
	scurfpea	PSORA2	*Psoralidium*	12–48	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	12–36	–
	goldenrod	SOLID	*Solidago*	12–36	–
	white heath aster	SYER	*Symphyotrichum ericoides*	12–36	–
	milkvetch	ASTRA	*Astragalus*	0–36	–
	blazing star	LIATR	*Liatris*	0–36	–
	western yarrow	ACMIO	*Achillea millefolium var. occidentalis*	12–36	–
	yellow salsify	TRDU	*Tragopogon dubius*	0–36	–
	purple locoweed	OXLA3	*Oxytropis lambertii*	12–24	–
	pussytoes	ANTEN	*Antennaria*	0–24	–
	wavyleaf thistle	CIUN	*Cirsium undulatum*	12–24	–
	white prairie aster	SYFA	*Symphyotrichum falcatum*	0–24	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	12–24	–
	leafy wildparsley	MUDI	*Musineon divaricatum*	0–12	–
	desertparsley	LOMAT	*Lomatium*	0–12	–
Shrub/Vine					
9				12–60	
	prairie sagewort	ARFR4	*Artemisia frigida*	12–48	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	12–48	–
	prairie rose	ROAR3	*Rosa arkansana*	12–48	–
	western snowberry	SYOC	*Symphoricarpos occidentalis*	12–36	–
	Subshrub (<.5m)	2SUBS	*Subshrub (<.5m)*	0–12	–

Table 11. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Wheatgrass**			190–570	
	western wheatgrass	PASM	*Pascopyrum smithii*	190–570	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	0–95	–
2	**Needlegrass**			95–285	
	green needlegrass	NAVI4	*Nassella viridula*	95–285	–
	shortbristle needle and thread	HECU9	*Hesperostipa curtiseta*	0–95	–
	porcupinegrass	HESP11	*Hesperostipa spartea*	0–95	–
3	**Mid Warm-Season**			0–57	

	sideoats grama	BOCU	*Bouteloua curtipendula*	0–57	–
	plains muhly	MUCU3	*Muhlenbergia cuspidata*	0–57	–
	prairie dropseed	SPHE	*Sporobolus heterolepis*	0–57	–
4	**Short Warm-Season**			38–152	
	threeawn	ARIST	*Aristida*	38–152	–
	blue grama	BOGR2	*Bouteloua gracilis*	38–95	–
5	**Native Cool-Season**			19–57	
	sedge	CAREX	*Carex*	19–57	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	0–57	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	0–57	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–38	–
6	**Other Native Grasses**			0–19	
	Grass, perennial	2GP	*Grass, perennial*	0–19	–
	big bluestem	ANGE	*Andropogon gerardii*	0–19	–
	saltgrass	DISP	*Distichlis spicata*	0–19	–
7	**Non-Native Grasses**			285–570	
	bluegrass	POA	*Poa*	95–475	–
	smooth brome	BRIN2	*Bromus inermis*	95–380	–
	cheatgrass	BRTE	*Bromus tectorum*	95–380	–
	crested wheatgrass	AGCR	*Agropyron cristatum*	38–285	–
Forb					
8	**Forbs**			38–95	
	Forb, annual	2FA	*Forb, annual*	0–95	–
	Forb, perennial	2FP	*Forb, perennial*	0–95	–
	sweetclover	MELIL	*Melilotus*	0–95	–
	white heath aster	SYER	*Symphyotrichum ericoides*	19–76	–
	white prairie aster	SYFA	*Symphyotrichum falcatum*	19–57	–
	yellow salsify	TRDU	*Tragopogon dubius*	19–57	–
	goldenrod	SOLID	*Solidago*	19–57	–
	scurfpea	PSORA2	*Psoralidium*	19–57	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	19–57	–
	blazing star	LIATR	*Liatris*	0–57	–
	wavyleaf thistle	CIUN	*Cirsium undulatum*	19–38	–
	western yarrow	ACMIO	*Achillea millefolium var. occidentalis*	19–38	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	0–38	–
	purple locoweed	OXLA3	*Oxytropis lambertii*	0–19	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	0–19	–
	autumn onion	ALST	*Allium stellatum*	0–19	–
	scarlet beeblossom	GACO5	*Gaura coccinea*	0–19	–
	milkvetch	ASTRA	*Astragalus*	0–19	–
Shrub/Vine					
9	**Shrubs**			19–95	
	western snowberry	SYOC	*Symphoricarpos occidentalis*	19–95	–

	prairie rose	ROAR3	*Rosa arkansana*	19–57	–
	prairie sagewort	ARFR4	*Artemisia frigida*	19–57	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–19	–
	Subshrub (<.5m)	2SUBS	*Subshrub (<.5m)*	0–19	–

Table 12. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Wheatgrass**			32–160	
	western wheatgrass	PASM	*Pascopyrum smithii*	32–160	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	0–32	–
2	**Needlegrass**			16–80	
	shortbristle needle and thread	HECU9	*Hesperostipa curtiseta*	0–80	–
	porcupinegrass	HESP11	*Hesperostipa spartea*	0–80	–
	green needlegrass	NAVI4	*Nassella viridula*	16–80	–
4	**Short Warm-Season**			32–160	
	threeawn	ARIST	*Aristida*	32–160	–
	blue grama	BOGR2	*Bouteloua gracilis*	0–48	–
5	**Native Cool-Season**			16–48	
	sedge	CAREX	*Carex*	16–48	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	0–48	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–32	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	0–16	–
6	**Other Native Grasses**			0–32	
	Grass, perennial	2GP	*Grass, perennial*	0–32	–
	saltgrass	DISP	*Distichlis spicata*	0–16	–
7	**Non-Native Grasses**			720–880	
	bluegrass	POA	*Poa*	320–640	–
	smooth brome	BRIN2	*Bromus inermis*	240–480	–
	cheatgrass	BRTE	*Bromus tectorum*	240–480	–
	crested wheatgrass	AGCR	*Agropyron cristatum*	80–320	–
Forb					
8	**Forbs**			80–160	
	sweetclover	MELIL	*Melilotus*	0–160	–
	Forb, annual	2FA	*Forb, annual*	0–80	–
	Forb, perennial	2FP	*Forb, perennial*	0–80	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	16–80	–
	white heath aster	SYER	*Symphyotrichum ericoides*	16–80	–
	yellow salsify	TRDU	*Tragopogon dubius*	16–64	–
	scurfpea	PSORA2	*Psoralidium*	16–64	–
	wavyleaf thistle	CIUN	*Cirsium undulatum*	16–48	–
	white prairie aster	SYFA	*Symphyotrichum falcatum*	16–48	–

	goldenrod	SOLID	*Solidago*	16–48	–
	blazing star	LIATR	*Liatris*	0–32	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	0–32	–
	western yarrow	ACMIO	*Achillea millefolium var. occidentalis*	16–32	–
	milkvetch	ASTRA	*Astragalus*	0–16	–
	scarlet beeblossom	GACO5	*Gaura coccinea*	0–16	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	0–16	–
Shrub/Vine					
9	**Shrubs**			16–80	
	western snowberry	SYOC	*Symphoricarpos occidentalis*	16–80	–
	prairie rose	ROAR3	*Rosa arkansana*	16–48	–
	prairie sagewort	ARFR4	*Artemisia frigida*	16–48	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–16	–
	Subshrub (<.5m)	2SUBS	*Subshrub (<.5m)*	0–16	–

Animal community

Wildlife Interpretations:
Under development.

Grazing Interpretations:
This site is well adapted to managed grazing by domestic livestock. The predominance of herbaceous plants across all plant community phases best lends these sites to grazing by cattle but other domestic grazers with differing diet preferences may also be a consideration depending upon management objectives. Often, the current plant community does not entirely match any particular plant community (as described in the ecological site description). Because of this, a resource inventory is necessary to document plant composition and production. Proper interpretation of this inventory data will permit the establishment of a safe, initial stocking rate for the type and class of animals and level of grazing management. More accurate stocking rate estimates should eventually be calculated using actual stocking rate information and monitoring data.

Utilization Level % Use Description
Slight (Light) 0-20 Appears practically undisturbed when viewed obliquely. Only choice areas and forage utilized.
Moderate 20-40 Almost all of accessible range shows grazing. Little or no use of poor forage. Little evidence of trailing to grazing.
Full 40-60 All fully accessible areas are grazed. The major sites have key forage species properly utilized (about half taken, half left). Points of concentration with overuse limited to 5 to 10 percent of accessible area.
Close (Heavy) 60-80 All accessible range plainly shows use and major sections closely cropped. Livestock forced to use less desirable forage, considering seasonal preference.
Severe > 80 Key forage species completely used. Low-value forages are dominant.

Hydrological functions

Water is the principal factor limiting herbage production on this site. The site is dominated by soils in hydrologic groups C with localized areas in hydrologic group D. Infiltration varies from moderately slow to slow and runoff potential varies from medium to very high for this site depending on soil surface texture, slope 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 increase 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

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 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 specialists. Those involved in developing this site description include: Stan Boltz, NRCS Range Management Specialist; Michael D. Brand, State Land Dept., Director Surface Management; David Dewald, NRCS State Biologist; Paul Drayton, NRCS District Conservationist; Jody Forman, NRCS Range Management Specialist; Dennis Froemke, NRCS Range Management Specialist; Jeff Printz, NRCS State Range Management Specialist; Josh Saunders, NRCS Range Management Specialist; Kevin Sedivec, Extension Rangeland Management Specialist; Darrell Vanderbusch, NRCS Resource Soil Scientist; and Lee Voigt, NRCS Range Management Specialist.

Other references

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Contributors

Jeff Printz
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Approval

Suzanne Mayne-Kinney, 1/11/2024

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 Printz, Stan Boltz, Lee Voigt, Jody Forman
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Date	03/01/2012
Approved by	Suzanne Mayne-Kinney
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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

3. **Number and height of erosional pedestals or terracettes:** None.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground < 5%.

5. **Number of gullies and erosion associated with gullies:** None.

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

7. **Amount of litter movement (describe size and distance expected to travel):** None.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil surface fragments will typically retain structure indefinitely when dipped in distilled water.

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/surface layer.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Combination of shallow and deep rooted species (mid & tall rhizomatous and tufted perennial cool- and warm-season grasses) with fine and coarse roots positively influences infiltration.

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: Mid cool-season rhizomatous grasses >

    Sub-dominant: Mid cool-season bunchgrasses >>

    Other: mid warm-season grasses = short cool-season grasses = tall warm-season = forbs > shrubs > grass-likes

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

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

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14. **Average percent litter cover (%) and depth (in):** Plant litter is in contact with soil surface.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 1300 2300 3100 lbs./acre air dry Depending upon growing conditions

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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, smooth bromegrass

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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 should have vigorous rhizomes or tillers.
