USDA Natural Resources Conservation Service

Ecological site R053AE060MT
Loamy (Lo) (Legacy) RRU 53AE

Last updated: 6/14/2023
Accessed: 05/04/2024

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.

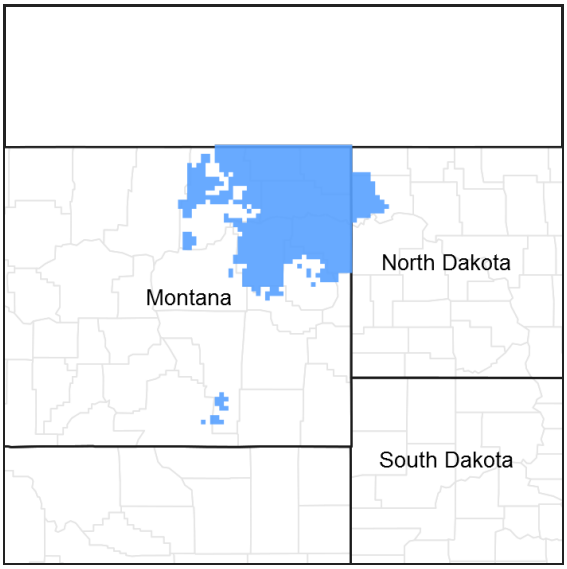


Figure 1. Mapped extent

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.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site usually occurs on till plains, but is also found on alluvial fans, and knolls. Slopes vary from 1-15%, but are usually less than 8%. Elevations generally range from 2,000 to 3,500 feet.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Till plain (3) Alluvial fan
Flooding duration	Brief (2 to 7 days)
Flooding frequency	None to rare

Ponding frequency	None
Elevation	572–1,158 m
Slope	1–15%
Aspect	Aspect is not a significant factor

Climatic features

A semi-arid, temperate climate characterizes the Glaciated Plains. The predominance of cool season species has evolved to take advantage of the precipitation regime that peaks in late spring-early summer (June). Seventy-five percent of the annual precipitation usually falls as steady, soaking, frontal system rains. Summer rains usually come with thunderstorms. Precipitation is the most important factor influencing production (Heitschmidt et al 2005). Severe drought occurs on average in two out of every ten years (Cooper, et al., 2001).

Table 3. Representative climatic features

Frost-free period (average)	129 days
Freeze-free period (average)	104 days
Precipitation total (average)	305 mm

Influencing water features

Soil features

These soils formed from glacial till. The surface layer of these soils varies from 0-7 inches in depth and are typically loam, silt loam, gravelly loam, clay loam, silty clay loam or sandy clay loam. Underlying layers are often clay loams, loams or silty clay loams. Soils are well drained, and are more than 20 inches deep to bedrock. Permeability varies from very slow to slow. Soil ph varies from 6.1-8.4.

Table 4. Representative soil features

Surface texture	(1) Loam (2) Silt loam (3) Clay loam
Drainage class	Well drained
Permeability class	Moderate to moderately slow
Soil depth	51–183 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	1–2%
Available water capacity (0-101.6cm)	12.7–17.78 cm
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Soil reaction (1:1 water) (0-101.6cm)	6.1–8.4
Subsurface fragment volume <=3" (Depth not specified)	4–11%
Subsurface fragment volume >3" (Depth not specified)	2–5%

Ecological dynamics

This ecological site developed through time under the influence of climate, geological parent material, fire, plants and animals. Research consistently shows that precipitation is the principal factor altering productivity on ecological sites in the Northern Great Plains (Heitschmidt et al. 2005). The same authors concluded that grazing reduces herbage standing crop, whereas its effects on above ground net primary production varies with timing of grazing and precipitation events, along with the functional and structural composition of the plant community.

It is theorized that these lands burned on a natural interval of 5-7 years (Frost 1998). Fires were ignited by lightening and by Early Americans whom were attempting to manipulate the environment.

The resultant historic climax plant community (HCPC) is the basis for plant community interpretations. The HCPC was determined by evaluating rangeland relic areas, and other areas protected from excessive disturbance. The HCPC is comprised of a mixture of cool and warm season grasses, forbs and shrubs. About 85% of the annual production is from grasses and sedges, most of which is produced during the cool season. Forbs and shrubs contribute10% and 5%, respectively, to total annual production. Total vegetative production averages 1600 lbs/ac during normal years.

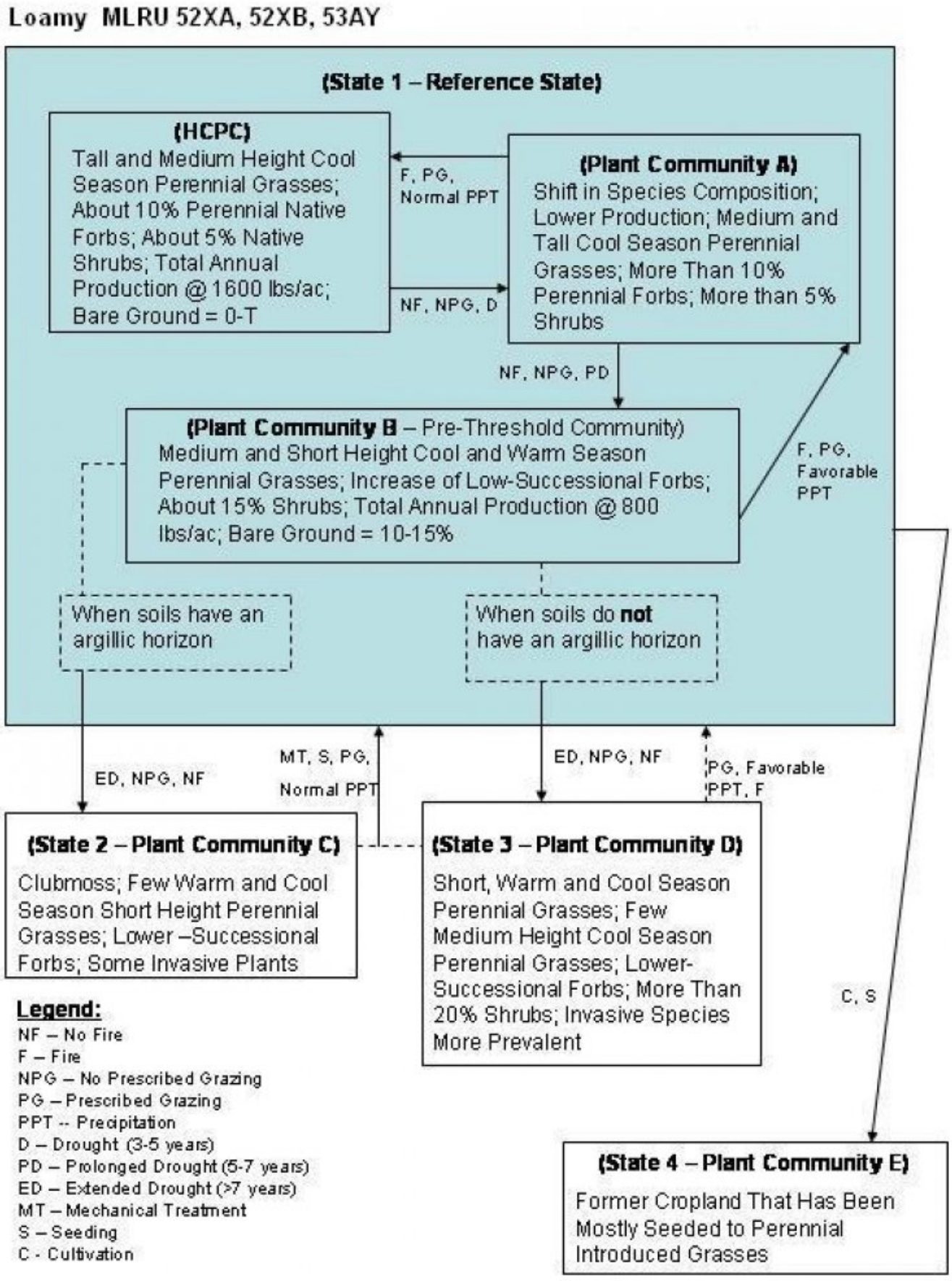
This site is resistant and resilient to disturbance. Departures in the HCPC are brought about by management actions, drought, a change in the natural fire regime, colonization and recruitment of noxious weeds, etc. The integrity of the site can be readily damaged with the continued absence of prescribed grazing and during prolonged drought. As the HCPC regresses to lower seral stages, the deep-rooted perennial grasses are replaced by blue grama, sandberg bluegrass, fringed sagewort, hoods phlox, threadleaf sedge, hairy goldenaster, and dense clubmoss. The dominance of these “lower-successional” species in the plant community disrupts ecological processes, impairs the biotic integrity of the site, and restricts the system’s ability to recover to higher seral states. The potential of succession back to the HCPC varies with the interaction of all environmental factors.

State and Transition Diagram

Trends in plant community dynamics, states, transitional pathways and thresholds have been evaluated and determined through experience and research. Successional pathways of the Loamy ecological site cannot be satisfactorily described using traditional theories of plant succession leading to a single climax community (Briske et al. 2005). As the HCPC regresses to an early seral state, it is theorized that a threshold is crossed somewhere within the mid-seral state. Plant communities occurring below this threshold are in a steady state. Succession back to the HCPC does not occur within a reasonable length of time, and/or without a large input of energy.

Three plant communities and the successional and regressional pathways that commonly occur within the Reference State (State #1) are shown in the following diagram. In addition, the transitions from Plant Community B (State #1) to State #2 (Plant Community C) and State #3 (Plant Community D) are also illustrated. A third transition denotes the pathway from State #1 to an introduced perennial grass seeding (State #4). Ecological processes are discussed in the plant community descriptions, which follow the diagram.

State and transition model



State 1
State #1: Historic Climax Plant Community (HCPC)

Community 1.1
State #1: Historic Climax Plant Community (HCPC)

The interpretive plant community for this site is the Historic Climax Plant Community (HCPC). Cool season tall and mid-grasses (such as green needlegrass, western wheatgrass, thickspike wheatgrass, porcupine grass and needleandthread grass) dominate the HCPC. These cool season grasses, plus the warm season little bluestem, represent about 75% of the total annual plant production in the community. Little bluestem is a dominant plant in the eastern Glaciated Plains. Prairie junegrass, upland sedges and plains reedgrass (cool season species) and blue grama (a warm season species) also occur in the HCPC. Dotted gayfeather, scurfpeas, prairie clovers and other forbs make up less than 10% of the annual production. American vetch, groundplum milkvetch, purple and white prairie clover and scurfpea are important because of their ecological role in the nitrogen cycle. Winterfat is the most prevalent shrub and is also a valuable forage plant for wildlife and livestock forage, but it seldom produces more than 80 lbs/ac in any community. Silver sagebrush and western snowberry commonly occur in the lower landscape positions of this site. They have some value for wildlife but tend to be restricted to lower landscapes that may benefit from rare flooding and livestock forage. Overall, shrubs account for about 5% of the annual plant production. Range inventory data collected (in 2001 and 2004) on the Fort Peck and Fort Belknap Indian Reservations indicate total above ground production varies from 1,270 to 2,550 lbs/ac. The scheduling of the inventories coincided with favorable precipitation cycles. Therefore, it is recommended that Thus, total annual production averages 1600 lbs/ac during normal years. Production varies from 1100 lbs/ac in unfavorable years to 2000 lbs/ac during favorable years. Average annual production is expected to increase and decrease, respectively on more mesic and xeric portions of the Glaciated plains. Similarity indices (SI) greater than 75% were recorded within the HCPC. This plant community is well adapted to the glaciated plains. Precipitation is the most important factor influencing production (Heitschmidt et al 2005). The functional and structural diversity of plant species (annuals, perennials, cool and warm season grasses, forbs and shrubs) optimize the capture of solar energy and maximize subsequent plant growth through the efficient use of available soil water and nutrient cycling. Following a prolonged disturbance which reduces the competitiveness of tall bunchgrasses, production of rhizomatous mid-grasses and short grasses increase. When disturbances are sustained for a prolonged period, woolly plantain, annual bromes or other annual species may invade a community. With proper grazing management and normal precipitation, these invader species normally do not persist for more than a few years. Litter covers about 60% of the soil surface. Bare ground varies from 0 to Trace. Rills should not be present and water flow patterns should be barely observable. Runoff and soil erosion increase as the HCPC regresses to earlier seral states.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1048	1524	1905
Forb	123	179	224
Shrub/Vine	62	90	112
Total	**1233**	**1793**	**2241**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	0%
Grass/grasslike foliar cover	0%
Forb foliar cover	0%
Non-vascular plants	0-5%
Biological crusts	0-2%
Litter	55-60%
Surface fragments >0.25" and <=3"	0-3%
Surface fragments >3"	0-2%
Bedrock	0%
Water	0-1%

Bare ground	0-1%

Table 7. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	1-3%
Grass/grasslike basal cover	25-35%
Forb basal cover	1-5%
Non-vascular plants	0%
Biological crusts	0%
Litter	0%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0%

Table 8. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	15-25%	5-15%	35-45%
>0.15 <= 0.3	–	35-45%	25-35%	45-55%
>0.3 <= 0.6	–	25-35%	35-45%	5-10%
>0.6 <= 1.4	–	5-15%	15-25%	0-5%
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Community 1.2
Plant Community A (State #1)

*Successional pathway from HCPC to Community A (State #1): Transition pathways from the HCPC are influenced by non-prescribed grazing, drought, cessation of the natural fire regime, colonization and recruitment of noxious weeds, etc. These are shown in the state-and-transition diagram. Plant Community A (State #1): Total production averages about 1300 lbs/ac for this community, about 80% of the production in the HCPC. Vigor and production of the warm season bunchgrasses (little bluestem and sideoats grama) and tall cool season bunchgrasses (green needlegrass, porcupine grass) are reduced. Production of the rhizomatous midgrasses (western and thickspike wheatgrass) and the short cool (prairie junegrass, sandberg bluegrass) and warm (blue grama) increase. Production of needleandthread also increases as it tends to replace green needlegrass, especially on soils with with less moisture holding capacity. Exact response by the lower successional species (blue grama, threadleaf sedge, sandberg bluegrass, fringed sagewort, silver sage brush, etc.) vary with the kind of disturbance (drought, cattle, etc.) and with precipitation (amount and timing). SI indices from 55-75% are associated with Plant Community A. In contrast to the HCPC, range conservationists have slight concerns regarding lower infiltration rates and potentially higher runoff rates, plant functional/structural group shifts, decreasing amount of litter, and increased presence of invasive plants. *Succession from Plant Community A to HCPC: Plant Community A is resilient. Successional processes can readily return this community to the HCPC. Succession is facilitated by prescribed grazing and the incorporation of the natural fire regime. This process can occur during periods of normal precipitation. *Transitional

Pathway from Plant Community A to Community B (State #1): Non-prescribed grazing, drought, colonization and recruitment of noxious weeds, and the continued absence of the natural fire regime will result in regression to Plant Community B.

Community 1.3
Plant Community B (State #1)

Plant Community B is dominated by medium and short height cool and warm season perennial grasses. Production of western wheatgrass, thickspike wheatgrass and needleandthread (medium height grasses) is similar (from 300-400 lbs/ac) to total production of the short grasses and sedges (blue grama, praire junegrass, sandberg bluegrass, threadleaf sedge, and plains reedgrass). Remnants of the bunchgrasses (little bluestem, green needlegrass, porcupine grass, and sideoats grama) remain in communities within the eastern Glaciated Plains. These desirable bunchgrasses usually produce from 100-200 lbs/ac in this Plant Community. Production of hairy goldenaster, scarlet globemallow, scurfpeas, hoods phlox, western yarrow and other lower-successional forbs increases relative to the production of the prairie clovers and American vetch. Production of lower successional forbs, fringed sagewort (half-shrub) and the native shrubs averages 320 lbs/ac. During the 2002-2004 range inventories conducted on the Fort Peck and Belknap Reservations, Similarity indices (SI) for this community varied from 25-55%. Total forage production averages about 800 lbs/acre, a 50% decline from the high seral state. In contrast to the HCPC, range conservationists express moderate to high concerns about plant community composition, functional/structural groups, litter, annual production, and invasive plants. Although plant Community B is fairly resilient, it is not highly resistant to disturbance. It is the pre-threshold community. Therefore it is critical that this community be recognized and strategies implemented to prevent further regression. Community B can readily regress to a lower state, from which succession back to the HCPC to Plant Community A would be restricted. *Succession from Plant Community B to Plant Community A: Successional processes can readily return Plant Community B to Plant Community A. Succession is facilitated by prescribed grazing, re-introduction of the natural fire regime, and a period of favorable precipitation. *Transition from Plant Community B to Communities C & D (States #2 & #3): Plant Community B regresses to either Plant Community C (State #2) or Community D (State #3). The pathways are determined by the presence (Community C) or absence of an argillic horizon (Community D) (see the state-and-transition diagram).

State 2
Plant Community C (State #2)

Community 2.1
Plant Community C (State #2)

Clubmoss, blue grama, sandberg bluegrass, and prairie junegrass dominate Plant Community C. At some locations, clubmoss will form a mat-like carpet over 30-70% of the ground. Although some western wheatgrass plants persist as single shoots with few seedstalks, it is difficult to find green needlegrass, little bluestem and other tall bunchgrasses. There are few seedlings of high-successional species emerging through the clubmoss-blue grama sod. Some researchers believe that this is due to an inadequate seedbank (Romo and Bai 2004). Wooly plantain, hoods phlox, hairy goldenaster and scarlet globemallow are common forbs. Fringed sagewort and pricklypear cactus are usually common in this Community. Japanese brome, cheatgrass and a few annual forbs are distributed throughout the Community, but generally contribute less than 10% of the total production. Each of the primary processes: 1) hydrology (the capture, storage and redistribution of precipitation), 2) energy capture (conversion of sunlight to plant and animal matter), and 3) nutrient cycling (the cycle of nutrients through the physical and biotic components of the environment) has been degraded beyond the point of self-repair within a reasonable length of time. For example, when tall, high producing, cool season grasses are replaced by increasers (such as blue grama, clubmoss and prairie junegrass), the abilities of the plant community to maximize the conversion of solar energy to plant biomass and efficiently utilize available precipitation are impaired. Less solar energy is captured and converted to plant carbohydrates. Plant productivity declines, and there are fewer plants and less litter to protect the soil. As clubmoss increases, it is theorized that infiltration decreases and/or surface runoff and soil evaporation increases. Because ecological processes of the site are no longer balanced and sustained, shallow rooted, warm season species gain a competitive advantage over the deep rooted, cool season species. The biotic integrity of the site is degraded. Thus, the transition from Plant Community B (State #1) to Plant Community C (State #2) crosses a threshold. Thresholds are defined as a point in space and time at which one or more of the primary ecological processes responsible for maintaining the sustained equilibrium of the state degrades beyond the point of self-

repair. *Succession or Regression from Plant Community C: Plant Community C is a steady state. It is resistant to further disturbance, and it lacks the resiliency to return to the Reference State. Anecdotal reports indicate that succession from a clubmoss-dominated community can be facilitated with livestock impact (hoof action, urination, etc.). However, significant succession has not been documented in research studies. Therefore, it is recommended that mechanical treatment is required to return this plant community to the Reference State (State #1). Because the seedbank of high-successional species is believed to be inadequate, it may be necessary to seed desirable species following the mechanical treatment.

State 3
Plant Community D (State #3)

Community 3.1
Plant Community D (State #3)

Plant Community D is dominated by short height cool and warm season perennial grasses (blue grama, prairie junegrass, plains reedgrass, sandberg bluegrass). A few high-successional medium and tall height perennial grasses persist in this community. Production of Japanese brome and cheatgrass accounts for 10 of total annual production. Total annual production of this community normally varies from 400-600 lbs/ac. Hairy goldenaster, scarlet globemallow, western yarrow, aster, biscuitroot, scurfpea, wallflower and other lower-successional forbs are common. In comparison to Plant Community B, production of fringed sagewort, prickly pear cactus and broom snakeweed generally increases significantly. The ecological concerns described for Plant Community C are also inherent in Plant Community D. Each of the primary processes: 1) hydrology (the capture, storage and redistribution of precipitation), 2) energy capture (conversion of sunlight to plant and animal matter), and 3) nutrient cycling (the cycle of nutrients through the physical and biotic components of the environment) has been degraded beyond the point of self-repair within a reasonable length of time. For example, when tall, high producing, cool season grasses are replaced by increasers (such as blue grama, clubmoss and prairie junegrass), the abilities of the plant community to maximize the conversion of solar energy to plant biomass and efficiently utilize available precipitation are impaired. Less solar energy is captured and converted to plant carbohydrates. Plant productivity declines, and there are fewer plants and less litter to protect the soil. Without the thick clubmoss cover, the potential for erosion is actually higher in this community than it is in Plant Community C. *Transition from Plant Community D to the Reference State (State #1): Community D is fairly resistant. Further regression is unlikely with prescribed grazing and normal precipitation. As a steady state, this community is not highly resilient. Ecological concepts and perspectives suggest that succession from this Community to the Reference State #1 is not likely to occur without significant inputs (i.e., mechanical treatment). However, anecdotal information suggests that succession from Plant Community D to State #1 may occur when prescribed grazing is combined with an extended period of favorable precipitation. The rate of succession would be influenced by the presence of a high-quality seedbank.

State 4
Plant Community E (State #4)

Community 4.1
Plant Community E (State #4)

*Transition from State #1 to Plant Community E (State #4): More than a million acres of former cropland in the Glaciated Plains have been seeded to introduced and native species. These seedings resulted from Society’s concerns regarding land stewardship and erosion, and have been largely funded by the Federal Government. These programs spanned from the 1940s (Bankhead Jones Act) to the present (Conservation Reserve Program - CRP). Crested wheatgrass was the primary species seeded under the direction of the Bankhead Jones Act. Crested wheatgrass, intermediate wheatgrass, smooth bromegrass and some native grasses were seeded during the Soil Bank Programs of the 1960-1970 era. Both introduced and native species were seeded during the CRP program (1985-present). There are over 220,000 acres of CRP in Valley County alone, the majority of which occur on the Loamy ecological site. The transition of these seeded communities from State #1 is depicted in the state-and-transition model. However, their future is not predicted. Depending on subsequent government programs and agricultural prices, these lands could stay in permanent vegetation with limited haying and grazing, be used as permanent pasture, or be converted to cropland.

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	**Native perennial grasses**			1–1098	
	little bluestem	SCSC	*Schizachyrium scoparium*	168–359	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	135–359	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	90–269	–
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	1–112	–
2	**Native perennial grasses**			179–448	
	porcupinegrass	HESP11	*Hesperostipa spartea*	90–224	–
	green needlegrass	NAVI4	*Nassella viridula*	90–224	–
3	**Native perennial grasses**			179–448	
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	90–224	–
	western wheatgrass	PASM	*Pascopyrum smithii*	90–224	–
4	**Native perennial grasses and grasslikes**			18–179	
	Grass, perennial	2GP	*Grass, perennial*	18–90	–
	blue grama	BOGR2	*Bouteloua gracilis*	18–90	–
	threadleaf sedge	CAFI	*Carex filifolia*	18–90	–
	plains reedgrass	CAMO	*Calamagrostis montanensis*	18–90	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	18–90	–
	Sandberg bluegrass	POSE	*Poa secunda*	18–90	–
Forb					
5	**Native perennial forbs**			36–179	
	dotted blazing star	LIPU	*Liatris punctata*	18–90	–
	American vetch	VIAM	*Vicia americana*	18–90	–
6	**Native perennial forbs**			36–179	
	white prairie clover	DACA7	*Dalea candida*	18–90	–
	purple prairie clover	DAPU5	*Dalea purpurea*	18–90	–
7	**Native perennial forbs**			1–101	
	Forb, perennial	2FP	*Forb, perennial*	18–28	–
	common yarrow	ACMI2	*Achillea millefolium*	18–28	–
	aster	ASTER	*Aster*	18–28	–
	hairy false goldenaster	HEVI4	*Heterotheca villosa*	18–28	–
	spiny phlox	PHHO	*Phlox hoodii*	18–28	–
	Missouri goldenrod	SOMI2	*Solidago missouriensis*	18–28	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	18–28	–
	prairie thermopsis	THRH	*Thermopsis rhombifolia*	18–28	–

	scurfpea	PSORA2	*Psoralidium*	18–28	–
	lesser spikemoss	SEDE2	*Selaginella densa*	0–1	–
Shrub/Vine					
8	**Native shrubs and half-shrubs**			18–90	
	winterfat	KRLA2	*Krascheninnikovia lanata*	18–90	–
9	**Native shrubs and half-shrubs**			11–78	
	Shrub, broadleaf	2SB	*Shrub, broadleaf*	11–22	–
	silver sagebrush	ARCA13	*Artemisia cana*	11–22	–
	prairie sagewort	ARFR4	*Artemisia frigida*	11–22	–
	rubber rabbitbrush	ERNAN5	*Ericameria nauseosa ssp. nauseosa var. nauseosa*	11–22	–
	rose	ROSA5	*Rosa*	11–22	–
	snowberry	SYMPH	*Symphoricarpos*	11–22	–
10	**Native shrubs and half-shrubs**			0–1	
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–1	–

Animal community

Livestock Management

This site evolved with grazing (bison, elk, deer and antelope, grasshoppers and jackrabbits, prairie dogs, etc.) fire and climatic extremes. The site is highly resistant to disturbances which may alter its ecological processes. It is also resilient. Following perturbations such as drought, which allows blue grama and other increasers to increase at the expense of the mid and tall grasses, succession occurs with subsequent rainfall. Total annual production averages 1600 lbs/ac during normal years.

Forage production shows far greater variations in response to changes in annual precipitation than to different grazing intensities (Heitschmidt et al 2005). However, proper stocking rates and a planned grazing system are needed to ensure that the site remains in the Reference State #1. Without proper grazing management, the tall and mid grass community regresses to a blue grama, prairie junegrass, dense clubmoss community. In comparison to the high seral state, suggested stocking rates on sites in early seral states are about 75% lower. Experience indicates that planned grazing prevents further deterioration on sites in low seral states. Once the plant communities of the Reference State regress to early-successional communities, mechanical treatment may be necessary to induce and facilitate succession back across the threshold.

Poisonous plants are not normally a problem on this site. However, some of the milk vetches, death camas, larkspur, etc. may cause losses when forage demand by livestock exceeds forage supply. These conditions are most likely to occur during drought or by “turning-livestock-out” in early spring, before soil and vegetation conditions are ready for grazing.

Wildlife Interpretations
The Loamy ecological site that is in high seral or HCPC stages provides forage for mule deer and antelope during most of the year. However, the overall forage potential is limited by the relatively low production and diversity of forbs and shrubs. Low shrub cover also limits the potential of the site for thermal and escape cover. Most deer use occurs along the edges of the site where it borders woody draws, coulees, badland range sites, etc.

The species diversity and cover associated with either the high seral or HCPC states also provide habitat for sharp-tailed grouse and other upland birds. Much of the use occurs along the transitions between the Loamy site and woodland draws. The relative absence of big sagebrush limits the potential of this site for sage grouse habitat. The few sage grouse that exist in the Glaciated Plains are associated with silver sagebrush.

Species diversity and litter also provide favorable habitats for deer mice, rabbits and other small mammals. Golden eagles, redtail and ferruginous hawks are often circling over the landscape searching for prey.

Sites that are in mid to low seral states are less suitable for big game, upland birds and small mammals. However, they are more suitable for prairie dogs. Prairie dog towns also have potential for use by burrowing owls, mountain plovers, and other wildlife species.

Plant Preferences by Animal Kind

Refer to NRCS Field Office Technical Guide, Section IIE, General Information, for tables displaying plant preferences by livestock and wildlife.

Hydrological functions

Soils associated with this ecological site are in Hydrologic Soil Groups B and C. Infiltration rates are generally moderate. The runoff potential is also moderate, depending on slope and ground cover.

Good hydrologic conditions exist on this site when it is in either a high seral state or at HCPC. Canopy cover (grass, forbs and shrubs) is greater than 90% in these communities, which is conducive to high infiltration rates and minimal runoff and erosion.

Sites in early or low seral state are generally considered to be in poor hydrologic condition. Concerns are valid, not because of the amount of bare ground, but because the dense clubmoss and blue grama restrict the ability of the desirable tall and mid-grasses to utilize available moisture. Erosion is probably minor on most of these Loamy sites because soil is either protected by mid and tall, cool-season grasses, or by dense clubmoss and bue grama. Regardless of condition, bare ground is usually minimal.

Wood products

This site has no significant value for wood products.

Other products

This site is suitable for livestock grazing from May through October. Because grasses comprise about 80% of the production, the site is better-suited for cattle rather than sheep grazing.

Other information

The Loamy ecological site in the central and eastern Glaciated plains is resistant to perturbations. However, the site loses its resiliency when the plant community regresses from a high to a mid seral state. As the site moves from HCPC to lower seral states, reproductive capability of desirable plants is restricted, annual production is less than 1/3 of its potential, litter is reduced, and the number of structural/functional groups are reduced.

Inventory data references

SCS-Range-417

ECS-1
Modified Double Sampling 92 2001-2004 MT Blaine, Roosevelt, Sheridan, Valley, Daniels

Other references

Briske, D. D., S. D.Fuhlendorf, and F. E. Smiens. 2005. State-and-transition models, thresholds, and rangeland health: a synthesis of ecological concepts and persepectives. Rangeland Ecol. Manage. 58: 1-10.

Frost,Cecil C. 1998. Presettlement fire frequency regimes of the United States: a first approximation. Pages 70-81 in Teresa L. Pruden and Leonard A. Brennan (eds.). Fire in ecosystem management: shifting the paradigm from suppression
to prescription. Tall Timbers Fire Ecology Conference Proceedings, No. 20. Tall Timbers Research Station,

Tallahassee, Fl.

Heitschmidt, R. K., K. D. Klement, and M. R. Haferkamp. 2005. Interactive effects of drought and grazing on Northern Great Plains rangelands. Rangelands Ecol. Manage. 58: 11-19.

Romo, J. T., and Y. Bai. 2004. Seed bank and plant community composition, mixed prairie of Saskatchewan. J. of Range Manage. 57:300-304.

Approval

Kirt Walstad, 6/14/2023

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)	Dr. John Lacey, Maxine Rasmussen, Jon Siddoway & Rick Bandy
Contact for lead author	
Date	03/30/2005
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills should not be present in HCPC. If in plant community A, careful examination will yield slight evidence of rills that are less than ½ inch deep, linear, but short in length. If in plant community B, rills would be visible, ½ inch deep or more, linear, rarely exceeding 1 foot in length. Distance between rills is irregular. If in plant community B, rills would be visible.

---

2. **Presence of water flow patterns:** Water flow patterns should not be observable in HCPC. If in plant community A, careful
examination will yield short discontinuous water flow patterns. If in plant community B, water flow patterns would be visible as long (more than 1feet) and continuous across the landscape.

---

3. **Number and height of erosional pedestals or terracettes:** Pedestals or terracettes would essentially be nonexistent in HCPC. If in plant community A, careful examination on slopes > 8% yield occasional pedestals and terracettes approximately ¼ inch above the soil surface. If in plant community B on slopes > 8%, pedestals and terracettes are frequent and ½ - ¾ inch above the soil surface.

---

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Less than 5% of the soil surface should be bare in HCPC. Bare ground should be less than 2” in diameter. If in plant community A, 5-10% of the soil surface can be exposed. If in plant community B, 25% of the soil

surface can be exposed.

5. **Number of gullies and erosion associated with gullies:** Gullies are not associated with any of the State 1 reference plant communities.

6. **Extent of wind scoured, blowouts and/or depositional areas:** Wind scoured, blowouts and/or depositional areas are not associated with any of the State 1 reference plant communities.

7. **Amount of litter movement (describe size and distance expected to travel):** Litter movement is not expected with HCPC or plant community A. If in plant community B, litter, both fine and coarse, movement is visible, especially on slopes > 8%, but the distance moved is less than 1 foot.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Stability class anticipated to be 5 or 6 under plant canopy.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** The surface layer is 0-7" deep. The color ranges from brown, grayish brown to dark grayish brown. Surface textures include loam, silt loam gravelly loam, clay loam, silty clay loam or sandy clay loam. Soil organic matter ranges from 2-4% with a high of 5% and a low of 1%.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** In HCPC, 90-95% plant canopy and 80-85% basal cover with 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. Infiltration rate is slow. If in plant community A, 90-95% plant canopy and 70-80% basal cover with small gaps between plants will still reduce raindrop impact and decrease overland flow. If in plant community B, 40-70% plant canopy and 50-75% basal cover with moderate gaps between plants, intensifies raindrop impact and increases overland flow. The site tends to be more xeric as runoff increases.

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 or soil surface crusting should be evident in any of the State 1 plant communities.

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 and mid-stature, cool season bunch grasses > mid-stature, cool season rhizomatous grasses> short stature, warm season rhizomatous grasses> forbs >shrubs. Plant community A: Mid-stature and tall, cool season bunch grasses > mid-stature, cool season rhizomatous grasses> short stature, warm
    season rhizomatous > forbs = shrubs.

    Sub-dominant: Plant community B: Mid-stature cools season bunch grasses > mid-stature, cool season rhizomatous

grasses > short stature, warm season rhizomatous grasses > shrubs > forbs.

Other:

Additional:

---

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Plant mortality and decadence very low in HCPC and Plant community A. In periods of drought, shrubs would exhibit decadence in the state 1 reference communities.

---

14. **Average percent litter cover (%) and depth (in):** Litter cover is in contact with soil surface. Litter decreases in Plant community A to 40-50% and depth is reduced to 0.5 inch. Litter decreases to about 15% in Plant community B and is less than ½ inch deep.

---

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 800 - 2000 #/acre from Plant community B to HCPC in the State 1 reference community.

---

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:** Needle and thread, blue grama, threadleaf sedge, fringed sagewort, plains prickly pear, silver sagebrush, broom snakeweed, leafy spurge, dense clubmoss.

---

17. **Perennial plant reproductive capability:** All species are capable of reproducing in HCPC and Plant community A. In Plant community B, plant seedlings will be weighed in favor of marginal and undesirable species. Replacement of desirable species will be very few.
