USDA Natural Resources
Conservation Service

Ecological site R053AE065MT
Clayey Steep (Cystp) (Legacy) RRU 53AE

Accessed: 05/11/2025

General information

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

Figure 1. Mapped extent

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

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site occurs on slopes of till plains, hills and ridges that drain into stream valleys and channels. Slopes are usually greater than 15%. This site occurs on all exposures. Elevations normally range from 2200 to 3500 feet.

Table 2. Representative physiographic features

Landforms	(1) Till plain (2) Ridge (3) Hill
Flooding frequency	None
Ponding frequency	None
Elevation	2,000–4,000 ft
Slope	15–55%

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)	12 in

Influencing water features

Soil features

These soils were formed in glacial till. They occur on steep or hilly landscapes. The surface layer of these soils are usually less than 3 inches in depth and typically have a clay loam, silty clay loam, silty clay, sandy clay, sandy clay loam, and clay texture. The underlying material is typically a clay loam to a depth of 60 inches or more. Soils are often calcareous. Soils are well drained and permeability is very slow. This site is characterized by the following soil components: Sunburst, Bascovy, and Abor. Soil ph varies from 7.4 to 9.0.

Table 4. Representative soil features

Surface texture	(1) Clay loam (2) Silty clay (3) Clay
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Very slow
Soil depth	20–72 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	4–7 in
Calcium carbonate equivalent (0-40in)	0–10%
Electrical conductivity (0-40in)	0–8 mmhos/cm
Sodium adsorption ratio (0-40in)	0–10
Soil reaction (1:1 water) (0-40in)	7.4–9
Subsurface fragment volume <=3" (Depth not specified)	0–10%

Subsurface fragment volume >3" (Depth not specified)	0–3%

Ecological dynamics

This ecological site developed under Northern Great Plains climatic conditions, the natural influence of large herbivores and a fire frequency of 5-7 years (Frost 1998).

Plant community interpretations are based on the Historic Climax Plant Community (HCPC). Changes in the HCPC are brought about by frequency, timing and intensity of past grazing use, series of dry or wet years, or disturbances by fire, insect infestations, noxious weed invasions, etc. As the HCPC regresses to lower seral stages, the deep-rooted cool and warm season perennial grasses are replaced by warm season short perennial grasses (blue grama, sandberg bluegrass, etc), and warm season forbs and half-shrubs (fringed sagewort, hoods phlox, threadleaf sedge, hairy gold aster, and dense clubmoss). The dominance of these short grasses, warm season forbs and half-shrubs in the plant community disrupts ecological processes, impairs the biotic integrity of the site, and adversely affects resiliency. The system’s ability to recover to higher seral states is restricted or impeded.

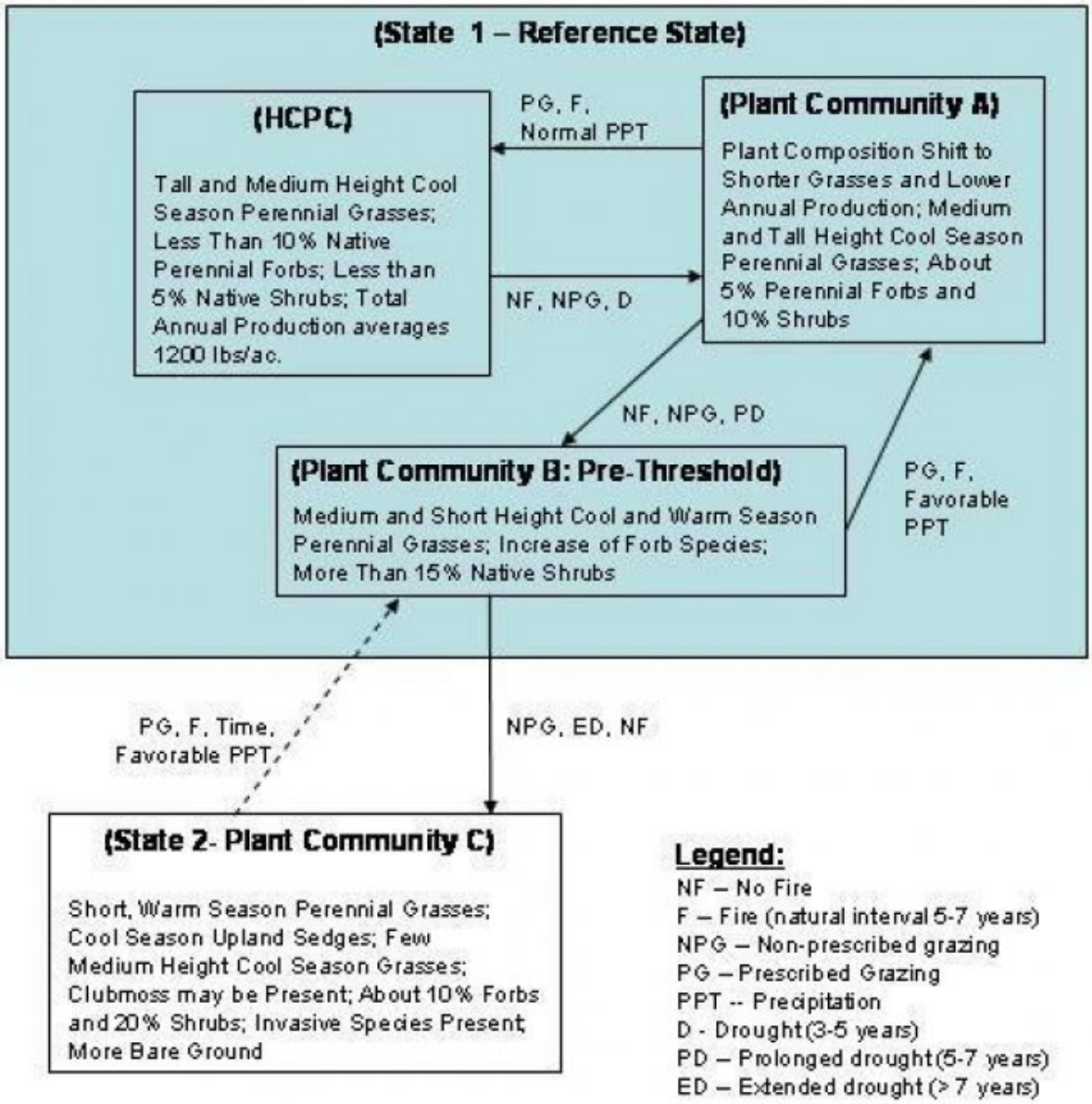
State and Transition Diagram

Traditional theories of plant succession leading to a single climax community are inadequate for understanding the complex successional pathways of this ecological site in the glaciated plains (Stringham et al. 2003). This ecological site is more aptly described using state-and-transition vegetation dynamics in a non-linear framework. A “state” is an alternative, persistent vegetation community that is not simply reversible in the linear successional framework. States are depicted as seral stages, while pathways between states are “transitions.” The latter can be transient or persisting (crosses a threshold). Transitions may be triggered by climatic events, fire, grazing, farming, etc.

Three important plant communities and associated successional pathways for the Reference state (State #1), and the transitions across a threshold to State #2 are illustrated below for a Clayey-Steep 10-14” p.z. site in the Glaciated Plains.

State and transition model

Clayey-Steep MLRU 52XA, 52XB, 53AY



State 1
State #1: Historic Climax Plant Community

Community 1.1
Historic Climax Plant Community

State #1: Historic Climax Plant Community (HCPC) The interpretive plant community for this site is the Historic Climax Plant Community (HCPC). This community is highly resistant and resilient to change. Cool and warm season, tall and mid-grasses (such as green needlegrass, little bluestem, bluebunch wheatgrass, western wheatgrass, and thickspike wheatgrass) dominate the HCPC. Grasses represent about 85% of the total annual production in the community. Dotted gayfeather, white prairie clover, and purple prairie clover are warm season forbs that commonly occur on Clayey-Steep 10-14” p.z. sites. American vetch is a highly palatable, common cool season forb. American vetch and the prairie clovers are nitrogen-fixing plants. Although these have a much lower value as forage, ground plum milkvetch, milkvetch, prairie thermopsis and scurfpea are also nitrogen-fixing legumes. White milkwort, biscuitroot, wild onion and western yarrow may be present as a minor component of the plant community. Forbs represent about 5% of the total annual production. Winterfat, silver sagebrush and rose are common shrubs. Winterfat is valuable forage for wildlife and livestock. Silver sagebrush and fringed sagewort, two warm season shrub species, may represent a minor component of the HCPC. One would not expect to find more than a trace of broom snakeweed and prickly pear cactus in the HCPC. Very few cool-season shrubs grow on the site. Overall, shrubs account for about 10% of the annual plant production. Historic NRCS data indicate that total annual production averages 1200 lbs/ac during normal years on Clayey-Steep 10-14” p.z. ecological sites. The 1200-lb estimate is supported by experience of Area Range Conservationists and by range inventory data collected (in 2001 and 2004) on the Fort Peck and Fort Belknap Indian Reservations. Production varies from 850 to 1450 lbs/ac in unfavorable and favorable years, respectively. Average annual production is expected to increase and decrease, respectively on more mesic and xeric portions of the eastern Glaciated plains. Although similarity indices (SI) >75% are expected to be associated with the HCPC, none were recorded during the recent range inventories. Annual bromes and other annual species may colonize the HCPC following a drought or periods of non-prescriptive grazing. Continual adverse impacts over a period of several years will cause a shift in species composition from the mid and tall cool season grasses to prairie junegrass, plains reedgrass, white milkwort, fringed sagewort, etc. With proper grazing management and non-drought conditions, the higher successional cool season perennial plants regain vigor and will replace the lower successional species within a few years. Litter is in contact with 50-60% of the soil surface. Less than 10% of the soil surface should be bare, or unprotected by litter, rock, moss, and plant canopy. Rills should not be present and water flow patterns should be barely observable. Soil erosion by wind and water should be minimal. Runoff and soil erosion increase as the HCPC regresses to earlier seral states.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	725	1020	1230
Shrub/Vine	85	120	150
Forb	40	60	70
Total	**850**	**1200**	**1450**

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	50-60%
Surface fragments >0.25" and <=3"	0-3%
Surface fragments >3"	0-2%
Bedrock	0%

Water	0-1%
Bare ground	0-10%

Table 7. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	5-10%
Grass/grasslike basal cover	20-25%
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 (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	15-30%	5-15%	30-50%
>0.5 <= 1	–	30-50%	30-50%	40-60%
>1 <= 2	–	20-40%	30-50%	5-10%
>2 <= 4.5	–	5-15%	5-15%	1-5%
>4.5 <= 13	–	–	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Community 1.2
Plant Community A

*Successional pathway from HCPC to Community A (State #1): Successional pathways from the HCPC are influenced by frequency, timing and intensity of grazing, precipitation patterns, fire, insect infestations, noxious weed colonization and recruitment, etc. As communities regress from HCPC, medium and short grasses increase at the expense of mid and tall cool season grasses. The medium and short grasses are comprised of cool and warm season species. Plant Community A (State #1): Total plant production averages about 1,000 lbs/ac in this Plant Community, or 200 lbs/ac less than the HCPC. The decrease in production results from a shift in species composition. Western/thickspike wheatgrasses, threadleaf sedge, blue grama and plains reedgrass increase at the expense of the tall, cool and warm season grasses (bluebunch wheatgrass, green needlegrass and little bluestem). In comparison to the HCPC, production of blue grama, prairie junegrass, plains reedgrass, threadleaf sedge and other short grasses now accounts for about 20% of the total annual production. Exact responses of these species vary with the kind, intensity, frequency and duration of disturbance (drought, grazing, etc.) and precipitation (amount and timing). Total production of native forbs remains at about 5% of annual production of the community. However, the palatable species (prairie clovers, American vetch and dotted gayfeather) decrease in abundance (relative to the HCPC). The open niches allow hairy goldenaster, bastard toadflax, prairie thermopsis, etc. to become more abundant. Shrubs continue to account for about 10% of the total production. However, species such as fringed

sagewort and silver sagebrush increased (relative to the HCPC). SI indices from 55-75% are associated with this community. In contrast to the HCPC, range conservationists have serious concerns regarding lower infiltration rates and potentially higher runoff rates, plant functional/structural group shifts, and decreasing amount of litter. *Successional Pathway from Community A to HCPC: Plant Community A is resilient. Successional processes can readily return Plant Community A to the HCPC. The process can be facilitated by prescribed grazing, the incorporation of the natural fire regime into the system, etc. Prior to the arrival of European man, fire occurred at natural intervals of 5-7 years. This succession can occur during normal precipitation regimes. *Successional Pathway from Community A to Community B: Prolonged drought, non-prescribed grazing, and the failure to re-introduce fire into the system will result in retrogression to Community B. The causative factors of regression at a specific site should be apparent with careful observation.

Community 1.3
Plant Community B: Pre- Threshold

Plant Community B (State #1): Plant Community B is dominated by needleandthread grass, blue grama, plains reedgrass, prairie junegrass and upland sedges. Individual plants and remnants of bluebunch wheatgrass, green needlegrass, western/thickspike wheatgrasses and little bluestem remain in the Community. They have low vigor and there is little successful regeneration. There is an increased presence of lower successional plants. The short grasses and grasslike plants make up about 30% of the total production. Japanese brome, cheatgrass, and lower successional forbs colonize disturbed areas. Total vegetative production declines to about 800 lbs/ac in a normal year. Hairy goldenaster, scarlet globemallow, scurfpeas, cudweed sagewort and other warm season forbs increase at the expense of the prairie clovers and American vetch. Forbs increase and account for about 10% total annual production. Fringed sagewort, a half-shrub, increases at the expense of winterfat. Silver sagebrush, rose and prickly pear cactus also increase in some locations on this site. Shrubs account for about 15% of the total plant production. SI indices for this community vary from 35-55%. Litter provides cover for about 25-30% of the ground, while bare ground increases to about 25%. Rills, water flow patterns and litter movement are evident on the site. The tall cool season grasses have poor vigor, with little seed production. Most of the seedlings and young plants appear to represent short grasses and warm season forbs. Regeneration of desired species is inadequate. Plant Community B is fairly resilient, but it is not highly resistant to disturbance. It is the “pre-threshold” community. Therefore, it is critical that this community be recognized and management strategies implemented to prevent further regression (USDI and USDA 2000). Community B can readily regress to a lower state (State #2), from which succession back to any community within State #1 is restricted without significant energy inputs. *Successional Pathway from Community B to Higher Communities: Favorable precipitation, re-introduction of the natural fire regime, and prescribed grazing are normally required for succession to higher communities (HCPC and/or Community A). Management strategies should focus on grazing deferment to increase vigor and seed production of desirable plants, and to increase litter cover. Increasing litter is extremely critical to protect soils from erosion due to the steepness of the slopes. *Transition from Community B to State #2: Any combination of extended drought, non-prescribed grazing and unfavorable climatic patterns can cause regression from Plant Community B to State #2. As bare ground increases, 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 continue to gain a competitive advantage over the deep rooted, cool season species. The biotic integrity of the site is degraded (USDI, USDA 2000). Thus, the transition from Community B to State #2 represents 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 degrade beyond the point of self-repair.

State 2
Plant Community C (State #2)

Community 2.1
Plant Community C

Plant Community C (State #2): Community C is dominated by blue grama, prairie junegrass, sandberg bluegrass, plains reedgrass, other short grasses, and clubmoss. There are usually some individual western wheatgrass, bluebunch wheatgrass, little bluestem, etc. plants scattered throughout the Community. The ability of these individuals to persist in this state may be due to the relative inaccessibility of the site to grazing. Red threeawn, Japanese brome and cheatgrass are the most common opportunistic plants that colonize this Community. Wooly plantain, hoods phlox, hairy goldenaster, cudweed sagewort and bastard toadflax are common forbs. Fringed

sagewort usually increases. Silver sagebrush and rose may also increase. Pricklypear cactus is common in most locations. The most palatable shrubs are nearly absent. SI indices of less than 25% are probably associated with State #2, but none were recorded during the range inventories on Fort Peck and Fort Belknap Reservations in 2001 and 2004. Because of slope and texture, surface runoff and soil erosion should always be concerns on this site. However, wind and water erosion are critical concerns in State #2. As plant cover and litter decrease, rills, water flow patterns and litter movement become more apparent and the potential for erosion escalates. In comparison to the State #1 plant communities, Plant Community C (State #2) is less efficient in capturing solar energy and converting it to carbohydrates for plant growth. Total aboveground vegetation production averages about 400 lbs/ac. The scarcity of tall and mid cool season perennial grasses, plus the shift from cool season plants to warm season plants, indicates that the structural and functional processes of the site have been disrupted. *Transition from States #2 to State #1: Succession from State #2 to State #1 is favored by the implementation of prescribed grazing, a favorable precipitation pattern, and the re-introduction of the natural fire regime. The rate of this succession is influenced by the genetic pool of HCPC plants (seed plants, rhizomes, and seed bank) remaining on the site (Dyksterhuis 1949). In rare instances of prolonged favorable climatic conditions combined with proper management, the significant input of energy that is normally required to move this site from across the threshold from State #2 to State #1 may not be needed. More research is needed on this assertion. Because of the steep slopes, mechanical treatments and range seeding are not recommended. Ranchers should be aware of the limitations of this site. Rather than trying to change nature, managers must learn to live within the environmental boundaries of this site.

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	**Native perennial grasses**			180–360	
	tufted wheatgrass	ELMA7	*Elymus macrourus*	90–180	–
	western wheatgrass	PASM	*Pascopyrum smithii*	90–180	–
2	**Native perennial grasses**			20–1020	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	100–300	–
	little bluestem	SCSC	*Schizachyrium scoparium*	160–240	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	20–180	–
	plains muhly	MUCU3	*Muhlenbergia cuspidata*	20–180	–
	green needlegrass	NAVI4	*Nassella viridula*	60–180	–
3	**Native perennial grasses and grasslikes**			10–120	
	Grass, perennial	2GP	*Grass, perennial*	10–40	–
	blue grama	BOGR2	*Bouteloua gracilis*	10–40	–
	threadleaf sedge	CAFI	*Carex filifolia*	10–40	–
	plains reedgrass	CAMO	*Calamagrostis montanensis*	10–40	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	10–40	–
	Sandberg bluegrass	POSE	*Poa secunda*	10–40	–
Forb					
4	**Native perennial forbs**			10–60	
	dotted blazing star	LIPU	*Liatris punctata*	10–60	–
	American vetch	VIAM	*Vicia americana*	10–60	–
5	**Native perennial forbs**			10–60	
	white prairie clover	DACA7	*Dalea candida*	10–60	–
	purple prairie clover	DAPU5	*Dalea purpurea*	10–60	–

	purple prairie clover	DAPU5	*Dalea purpurea*	10–30	
6	**Native perennial forbs**			1–40	
	Forb, perennial	2FP	*Forb, perennial*	1–15	–
	common yarrow	ACMI2	*Achillea millefolium*	1–15	–
	pussytoes	ANTEN	*Antennaria*	1–15	–
	groundplum milkvetch	ASCR2	*Astragalus crassicarpus*	1–15	–
	aster	ASTER	*Aster*	1–15	–
	milkvetch	ASTRA	*Astragalus*	1–15	–
	bastard toadflax	COUM	*Comandra umbellata*	1–15	–
	buckwheat	ERIOG	*Eriogonum*	1–15	–
	hairy false goldenaster	HEVI4	*Heterotheca villosa*	1–15	–
	beardtongue	PENST	*Penstemon*	1–15	–
	spiny phlox	PHHO	*Phlox hoodii*	1–15	–
	white milkwort	POAL4	*Polygala alba*	1–15	–
	scurfpea	PSORA2	*Psoralidium*	1–15	–
	Missouri goldenrod	SOMI2	*Solidago missouriensis*	1–15	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	1–15	–
	prairie thermopsis	THRH	*Thermopsis rhombifolia*	1–15	–
	lesser spikemoss	SEDE2	*Selaginella densa*	0–1	–
Shrub/Vine					
7	**Native shrubs and half-shrubs**			24–120	
	Nuttall's saltbush	ATNU2	*Atriplex nuttallii*	12–60	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	12–60	–
8	**Native shrubs and half-shrubs**			1–80	
	Shrub, broadleaf	2SB	*Shrub, broadleaf*	1–25	–
	silver sagebrush	ARCA13	*Artemisia cana*	1–25	–
	prairie sagewort	ARFR4	*Artemisia frigida*	1–25	–
	rubber rabbitbrush	ERNAN5	*Ericameria nauseosa ssp. nauseosa var. nauseosa*	1–25	–
	creeping juniper	JUHO2	*Juniperus horizontalis*	1–25	–
	rose	ROSA5	*Rosa*	1–25	–
	snowberry	SYMPH	*Symphoricarpos*	1–25	–
9	**Native shrubs and half-shrubs**			1–25	
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	1–25	–
	brittle pricklypear	OPFR	*Opuntia fragilis*	0–1	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–1	–

Animal community

Livestock Management

This site evolved with trampling, defoliation (ungulates, grasshoppers and jackrabbits, and other herbivores), fire and drought. The site is moderately resistant and resilient to disturbances which may alter its ecological processes. Following perturbations such as drought, which allows blue grama and other lower successional plants to increase at the expense of the mid and tall grasses, succession occurs with subsequent rainfall. Thus, the HCPC, or

Communities A or B may be present at any given time in State #1. During “average” years, the site has the potential to produce 1200 lbs of forage per acre.

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 prescribed grazing is needed to ensure that the site remains in State #1. Without proper grazing management the mid-to-tall grass community will transition to State #2 plant community species. In comparison to State #1, suggested stocking rates on sites in State #2 represent a 4-fold reduction. Experience indicates that prescribed grazing prevents further deterioration in State #2. However, significant plant succession may not occur within a reasonable time frame.

Death camas, milk vetch (Astragalus spp.), and white point loco may occur on this ecological site. However, in the Glaciated Plains there are few reported incidences of livestock losses from these potentially poisonous plants. It is likely that forage production and livestock numbers are balanced, and livestock are not forced to graze the plant when it is most toxic.

Similarity indices (SI) of 25-55% characterized most of the Clayey-Steep 10-14” p.z. sites inventoried on the Fort Peck and Fort Belknap Reservations in 2001 -2004. SI’s of 0-25% were not encountered. In contrast, SI’s of 0-25% were frequently associated with adjacent Clayey 10-14” p.z. sites. Similar observations occur on other ranches in the eastern and central Glaciated Plains. In contrast to the Clayey 10-14” p.z. site (which occupies a lower landscape position) where very few highly palatable cool season grasses can be found because of repeated, frequent grazing events, a fairly diverse mix of desirable, cool season plants will be found growing on adjacent Clayey-Steep 10-14” p.z. sites.

This site is suitable for livestock grazing from May through October. The grass dominated plant community is better suited for cattle, rather than sheep grazing.
However, sheep are better adapted to grazing the steep slopes, especially if watering facilities are relatively distant. Therefore, a mix of cattle and sheep usage often merits consideration.

Wildlife Interpretations

State #1 of the Clayey-Steep 10-14” p.z. ecological site includes the HCPC and two additional communities. This state provides forage for mule deer during most of the year. Low shrub cover 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, badlands, etc.
Species diversity and cover associated with the HCPC or other communities in the Reference State (State #1) also provide habitat for sharp-tailed grouse and other upland birds. Most wildlife usage occurs along the transitions between the Clayey-Steep 10-14” p.z. site and deciduous wooded 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 usually 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.

Communities that are in State #2 are much less suitable for big game, upland birds and most species of small mammals. Prairie dogs usually are not found inhabiting Clayey-Steep sites because slopes exceed 15%. Prairie dogs typically prefer upland sites of <8% slope.

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 to slow. Permeability class is very slow. The runoff potential is high to very high, depending on slope and ground cover.

Good hydrologic conditions exist on Clayey-Steep 10-14” p.z. sites that are either in a high seral state or at the HCPC (State #1). Canopy cover (grasses, forbs and shrubs) is greater than 80% in these communities, which is conducive to moderately high infiltration rates and minimizes runoff and erosion.

Communities in early seral states (State #2) are generally considered to be in poor hydrologic condition. The potential for soil erosion increases in State #2. Plant cover and litter are inadequate to protect the soil surface and the amount of bare ground is excessive. As infiltration decreases, surface runoff and soil erosion increases. Thus, the site gradually becomes more xeric and also loses much of its organic matter and nutrients that are needed for the growth of higher successional plants.

Recreational uses

Hunters are probably the most common recreational user of this ecological site. The site is also used by hikers and photographers. The Clayey-Steep 10-14” p.z. site that is located near roads and towns often show symptoms of exuberant off-road ATV use. Unauthorized ATV use on this site increases susceptibility to erosion and to noxious weed invasion.

Wood products

This site has no significant value for wood products.

Other information

The Clayey-Steep 10-14” p.z. ecological site in the Glaciated Plains is resistant to perturbations. However, the site loses its resiliency when the plant community regresses from State #1 to State #2. Reproductive capability of higher successional plants and annual aboveground production decline as the site moves toward the threshold separating State #1 from State #2. Production in State #2 is less than 1/4 of the potential at HCPC. Thus, litter and the number of plant structural/functional groups are adversely affected.

Inventory data references

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Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

2. **Presence of water flow patterns:**

3. **Number and height of erosional pedestals or terracettes:**

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

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

7. **Amount of litter movement (describe size and distance expected to travel):**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

14. **Average percent litter cover (%) and depth (in):**

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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:**

17. **Perennial plant reproductive capability:**