USDA Natural Resources
Conservation Service

Ecological site R058AC041MT
Clayey (Cy) RRU 58A-C 11-14" p.z.

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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.

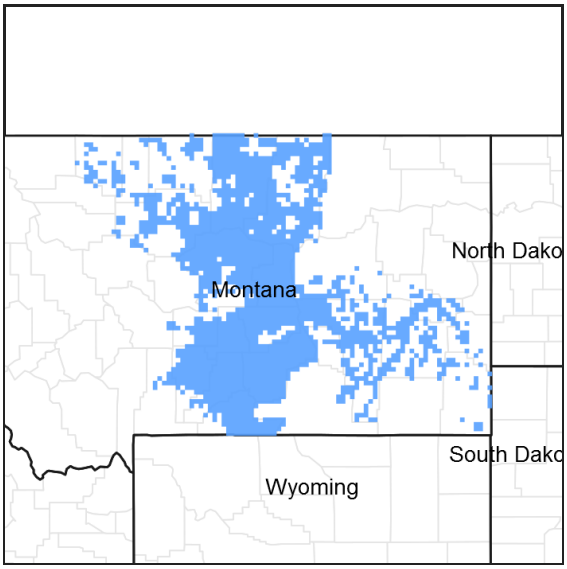


Figure 1. Mapped extent

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.

Associated sites

R058AC040MT	**Silty (Si) RRU 58A-C 11-14" p.z.** Silty 11-14"
R058AC047MT	**Clayey-Steep (CyStp) RRU 58A-C 11-14" p.z. Deleted. Refer to site: R058AC049MT** Clayey-steep 11-14"
R058AC054MT	**Claypan (Cp) RRU 58A-C 11-14" p.z.** Claypan 11-14"
R058AC059MT	**Shallow Clay (SwC) RRU 58A-C 11-14" p.z.** Shallow clay 11-14"

Similar sites

R058AC054MT	**Claypan (Cp) RRU 58A-C 11-14" p.z.** The Clay Pan site differs mainly by having a thinner surface over a hard argillic horizon, being sodium affected, and having lower production.
R058AC047MT	**Clayey-Steep (CyStp) RRU 58A-C 11-14" p.z. Deleted. Refer to site: R058AC049MT** The Clayey-Steep differs mainly by being on slopes greater than 15% and having lower production.

R058AC040MT	**Silty (Si) RRU 58A-C 11-14" p.z.** The Silty site differs mainly by soil texture.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Pseudoroegneria spicata* (2) *Nassella viridula*

Physiographic features

Table 2. Representative physiographic features

Landforms	(1) Fan (2) Terrace (3) Swale
Flooding frequency	None
Ponding frequency	None
Elevation	579–1,372 m
Slope	0–15%
Water table depth	152 cm
Aspect	Aspect is not a significant factor

Climatic features

Major Land Resource Area (MLRA) 58AC in Montana is considered to have a continental climate characterized by cold winters, hot summers, low humidity, light rainfall, and much sunshine. Extremes in temperature are typical. 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 and the winds move freely across the plains and account for rapid changes in temperature. Seasonal precipitation is often limiting for plant growth. Annual fluctuations in species composition and total production are typical depending on the amount and timing of rainfall.
Temperatures can be very extreme in this part of Montana. Summer daytime temperatures are typically quite warm, generally averaging in the mid to upper 80º's F for July and August. Summertime temperatures will typically reach in the 100º's F at some point during the summer, and can reach 90º F any month between May and September. Conversely, winter temperatures can be cold, averaging in the mid teens to mid 20º's F for December and January. There will typically be several days of below zero temperatures each winter. It is not uncommon for temperatures to reach 30–40º F below zero, or even colder, most any winter.

Spring can be windy throughout this MLRA, with winds averaging over 10 mph about 15 percent of the time. Speeds of 50 mph or stronger can occasionally occur as a weather system crosses this part of Montana.

The majority of the rangeland in MLRA 58AC is within the 11 to 14 inch Mean Annual Precipitation (MAP) range. During an average year, 70 to 75 percent of the annual precipitation falls between April and September, which are the primary growing season months.

Snowfall is not heavy in the area, averaging 28 total inches in the Yellowstone Valley. Heavy snowfall occurs infrequently, usually late in the winter or early spring. Snow cover is typically 1 to 3 inches.

The frost-free (32º F.) season averages about 105 to 145 days each year in the uplands, to nearly 170 days along the Yellowstone River Valley.

For local climate station information, refer to http://www.wcc.nrcs.usda.gov/cgibin/state.pl?state=mt.

Table 3. Representative climatic features

Frost-free period (characteristic range)	85-114 days
Freeze-free period (characteristic range)	112-133 days
Precipitation total (characteristic range)	305-356 mm
Frost-free period (actual range)	69-118 days
Freeze-free period (actual range)	108-139 days
Precipitation total (actual range)	305-381 mm
Frost-free period (average)	94 days
Freeze-free period (average)	122 days
Precipitation total (average)	330 mm

Climate stations used

- (1) RAPELJE [USC00246862], Rapelje, MT
- (2) MELSTONE [USC00245596], Musselshell, MT
- (3) HYSHAM 25 SSE [USC00244364], Bighorn, MT
- (4) BRANDENBERG [USC00241084], Rosebud, MT
- (5) TERRY 21 NNW [USC00248169], Terry, MT
- (6) BLOOMFIELD 5 NNE [USC00240923], Bloomfield, MT
- (7) GLENDIVE [USC00243581], Glendive, MT
- (8) POWDERVILLE 8 NNE [USC00246691], Volborg, MT
- (9) JORDAN 23 ENE [USC00244530], Jordan, MT
- (10) FT PECK PWR PLT [USC00243176], Fort Peck, MT
- (11) CIRCLE [USC00241758], Circle, MT
- (12) BROCKWAY 3 WSW [USC00241169], Brockway, MT
- (13) MILES CITY F WILEY FLD [USW00024037], Miles City, MT
- (14) MIZPAH 4 NNW [USC00245754], Ismay, MT
- (15) SAND CREEK [USC00247342], Roy, MT

Influencing water features

None

Soil features

These soils are typically clay loam, silty clay loam, silty clay, sandy clay, and clays that are more than 20 inches deep. There are no significant limitations to plant growth. Available Water Holding Capacity to a soil depth of 40 inches is approximately 5.5 to 6.0 inches.

Typical Soils include:
Bascovy, Marvan,Haverson, Heldt, Hydro, Kyle, Midway, Nunn, Razor, Toluca, Thedalund, Thurlow, Toluca, Twin Creek,Abor, Ethridge, Julin, Kobar, Linnet, Marias, Marvan, Pendroy, Ritchey, Tanna, Teigen, Thebo, Verson,Harlake
Megonot, Richey, Tanna, Harlem, Kobar,Teigen, Yamac, Greybear, Kobase, Pinelli,Zatoville, Arvada, Bew, Big Horn, Elso, Fort Collins, Grail, Hesper, Hydro, Keiser, Kyle, Lohmiller, Pierre, Vananda, Wanetta.

Table 4. Representative soil features

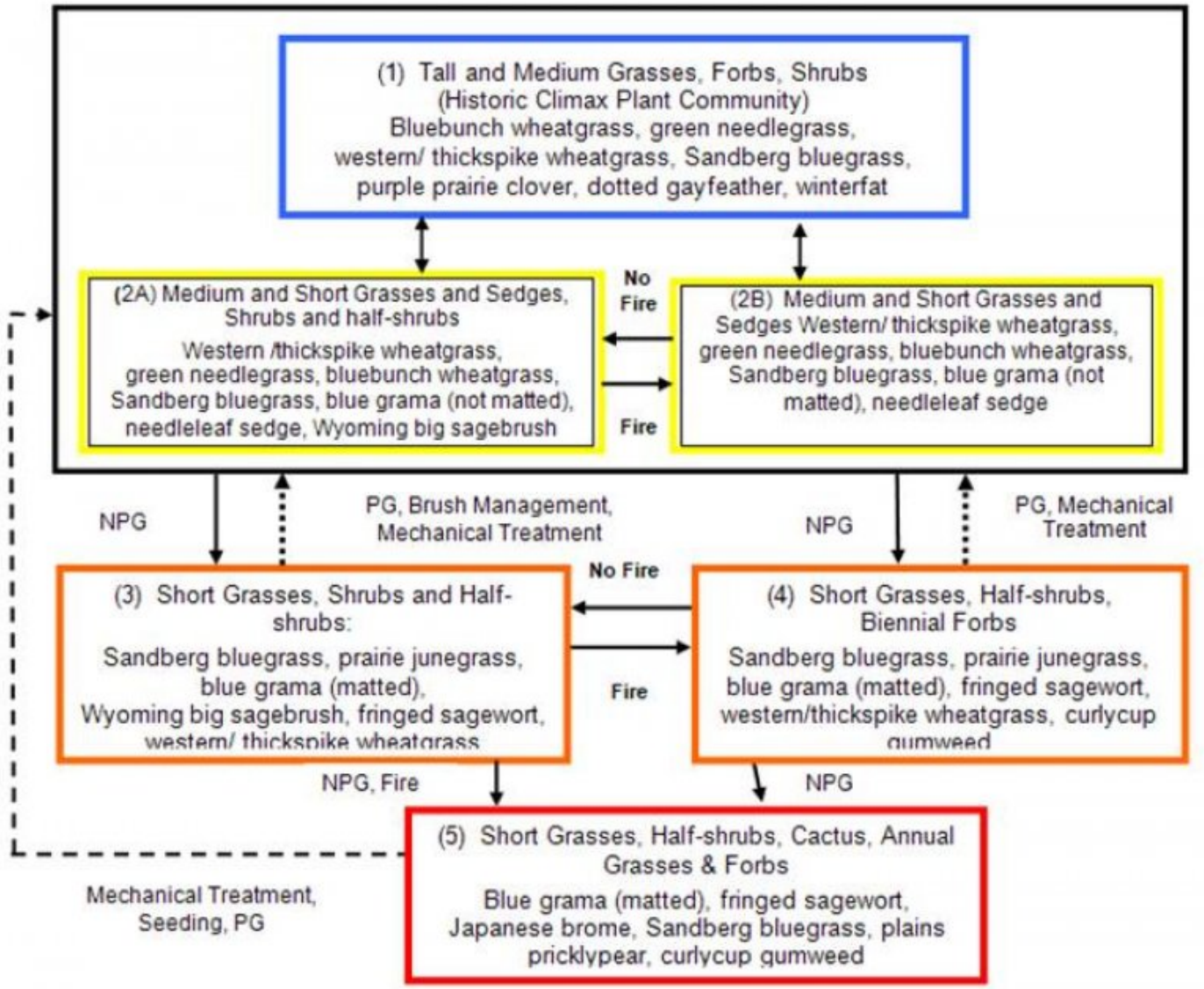
Drainage class	Well drained
Permeability class	Slow to very slow
Soil depth	51–152 cm

Available water capacity (0-101.6cm)	5.08–17.78 cm
Electrical conductivity (0-101.6cm)	0–4 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–5
Soil reaction (1:1 water) (0-101.6cm)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	2–12%
Subsurface fragment volume >3" (Depth not specified)	0–5%

Ecological dynamics

The following are descriptions of several plant communities that may occupy this site.

State and transition model



Smaller boxes within a larger box indicate that these communities will normally shift among themselves with slight variations in precipitation and other disturbances. Moving outside the larger box indicates the community has crossed a threshold (heavier line) and will require intensive treatment to return to Community 1 or 2. Dotted lines indicate a reduced probability for success. Yellow boxes indicate caution that the community may be in danger of crossing a threshold. Orange boxes represent communities that have crossed over thresholds from the HCPC and may be difficult to restore with grazing management alone. Red boxes represent communities that have severely shifted away from the HCPC and probably cannot be restored without mechanical inputs.

NOTE: Not all species present in the community are listed in this table. Species listed are representative of the plant functional groups that occur in the community.

PG = Prescribed Grazing: Use of a planned grazing strategy to balance animal forage demand with available forage resources. Timing, duration, and frequency of grazing are controlled and some type of grazing rotation is applied to allow for plant recovery following grazing.

NPG = Non-Prescribed Grazing: Grazing which has taken place that does not control the factors as listed above, or animal forage demand is higher than the available forage supply.

Fire: Prescribed fire or non-prescribed wildfire. Matted: > 50% cover

Figure 8. 58AC Clayey STM

State 1

State 1: Tall and Medium Grasses/Forbs/Shrubs (HCPC)

Community 1.1
Plant Community 1: Tall and Medium Grasses/Forbs/Shrubs (HCPC)

Figure 9. 58AC Clayey 1.1

The physical aspect of this site in the Historical Climax (HCPC) is that of a level to undulating grassland dominated by cool season grasses, with forbs and shrubs occurring in smaller percentages. Approximately 85-90% of the annual production by weight is from grasses and sedges, 1–5% is from forbs, and 5–10% is from shrubs, half-shrubs, and cacti. Canopy cover of shrubs is typically 1-5%. Trees are not significant on this site. Dominant species include bluebunch wheatgrass, green needlegrass, western or thickspike wheatgrass, and a diverse group of short grasses, such as Sandberg bluegrass, blue grama, and prairie junegrass. There are abundant forbs (purple and white prairie clover, prairie coneflower, dotted gayfeather) which occur in smaller percentages. Shrubs such as Wyoming big sagebrush and winterfat are common. This plant community is well adapted to the Northern Great Plains climatic conditions. The diversity in plant species and presence of tall, deep-rooted perennial grasses allows for drought tolerance. Plants on this site have strong, healthy root systems that allow production to increase significantly with favorable moisture conditions. Abundant plant litter is available for soil building and moisture retention. Plant litter is properly distributed with very little movement off-site and natural plant mortality is very low. This plant community provides for soil stability and a functioning hydrologic cycle.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1267	1450	1594
Shrub/Vine	126	161	177
Forb	65	81	89
Total	**1458**	**1692**	**1860**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	0-10%
Grass/grasslike foliar cover	70-85%
Forb foliar 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 7. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	1-4%
Grass/grasslike basal cover	5-15%
Forb basal cover	1-4%
Non-vascular plants	0%
Biological crusts	0-5%
Litter	50-70%
Surface fragments >0.25" and <=3"	0-5%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	10-20%

Table 8. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	–	–	–
>0.15 <= 0.3	–	–	–	1-5%
>0.3 <= 0.6	–	0-10%	70-85%	–
>0.6 <= 1.4	–	–	–	–
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

State 2
State 2: Medium and Short Grasses and Sedges/Shrubs and Half Shrubs

Community 2.1
Plant Community 2A: Medium and Short Grasses and Sedges/Shrubs and Half Shrubs

Figure 11. 58AC Clayey Community 2A

This community occurs over time with minor disturbances and lack of fire. Dominants include western or thickspike wheatgrass, Sandberg bluegrass, and blue grama (not matted). Bluebunch wheatgrass and green needlegrass will still be present but in smaller amounts. There may be an increase in the amount of Wyoming big sagebrush. Palatable and nutritious forbs will be replaced by less desirable and more aggressive species and half-shrubs such as fringed sagewort.

Community 2.2
Plant Community 2B: Medium and Short Grasses

Figure 12. 58AC Clayey Community 2B

The diversity of insect pollinators may be reduced as desirable forbs are replaced by more aggressive species. The partial loss of structural diversity makes this plant community somewhat less attractive to the variety of wildlife species using the HCPC or PPC. A decrease in residual plant material and litter cover is usually associated with degradation of the HCPC, which makes this community less attractive for ground-nesting birds. Pronghorn make considerable use of this type because of forb and half-shrub availability in the generally open landscape.

State 3
State 3: Short Grasses/Shrubs and Half Shrubs

Community 3.1
Plant Community 3: Short Grasses/Shrubs and Half Shrubs

Figure 13. 58AC Clayey Plant Community 3

Insect variety is considerably reduced at this stage because palatable forbs are mostly absent. Insects, particularly grasshoppers, may be very abundant during high points in population cycles. Heavy stands of big sagebrush can provide winter cover and foraging habitat for mule deer, elk, pronghorn and sage grouse. However, a decline in herbaceous cover and litter reduces overall wildlife species diversity and habitat value for amphibians, ground-nesting birds and small mammals. Prairie dogs will have an easier time establishing and expanding towns in this community to the benefit of burrowing owls, mountain plovers, and black-footed ferrets.

State 4
State 4: Short Grasses/Half Shrubs/Biennial Forbs

Community 4.1
Plant Community 4: Short Grasses/Half Shrubs/Biennial Forbs

Insect diversity is considerably lower than in higher seral communities and population fluctuations of grasshoppers may be extreme. Amphibian habitat is degraded following loss of litter cover and resulting warming and drying of the soil. Ground-nesting bird habitat value is significantly reduced because of lack of ground cover and residual vegetation in spring. Some species, such as the mountain plover and horned lark, may nest on the open ground surface. Pronghorn may forage on fringed sagewort, but big game habitat value is poor following loss of desirable forbs and grasses.

State 5
State 5: Short Grasses/ HalfShrubs/ Cactus/Annual Grasses and Forbs

Community 5.1
Plant Community 5: Short Grasses/ HalfShrubs/ Cactus/Annual Grasses and Forbs

Insect populations fluctuate wildly and are represented by fewer species than higher seral communities. Amphibian habitat is very poor on the hot, dry ground surface. When big sagebrush cover exceeds about 15%, this community may provide winter sage grouse habitat; nest cover for sage grouse and most other ground-nesting birds is poor because of a lack of standing herbaceous material and surface litter. Lek sites for sage and sharp-tailed grouse may be available in this type. General wildlife habitat is of low value. Shrubs and half-shrubs provide some winter range value for pronghorn and mule deer.

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 grasses**			1092–1417	
	bluebunch	PSSP6	*Pseudoroegneria spicata*	331–885	–

	wheatgrass				
	tufted wheatgrass	ELMA7	*Elymus macrourus*	130–354	–
	green needlegrass	NAVI4	*Nassella viridula*	65–354	–
	western wheatgrass	PASM	*Pascopyrum smithii*	130–354	–
2	**Native grasses**			13–177	
	Grass, perennial	2GP	*Grass, perennial*	13–89	–
	blue grama	BOGR2	*Bouteloua gracilis*	13–89	–
	needleleaf sedge	CADU6	*Carex duriuscula*	13–89	–
	threadleaf sedge	CAFI	*Carex filifolia*	13–89	–
	plains reedgrass	CAMO	*Calamagrostis montanensis*	13–89	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	13–89	–
	Sandberg bluegrass	POSE	*Poa secunda*	13–89	–
3	**Native grasses**			1–3	
	Fendler's threeawn	ARPUF	*Aristida purpurea var. fendleriana*	1–3	–
	Fendler threeawn	ARPUL	*Aristida purpurea var. longiseta*	1–3	–
Forb					
4	**Native forbs**			13–89	
	Forb, perennial	2FP	*Forb, perennial*	13–45	–
	common yarrow	ACMI2	*Achillea millefolium*	13–45	–
	onion	ALLIU	*Allium*	13–45	–
	aster	ASTER	*Aster*	13–45	–
	milkvetch	ASTRA	*Astragalus*	13–45	–
	white prairie clover	DACA7	*Dalea candida*	13–45	–
	purple prairie clover	DAPU5	*Dalea purpurea*	13–45	–
	hairy false goldenaster	HEVI4	*Heterotheca villosa*	13–45	–
	dotted blazing star	LIPU	*Liatris punctata*	13–45	–
	desertparsley	LOMAT	*Lomatium*	13–45	–
	silverleaf Indian breadroot	PEAR6	*Pediomelum argophyllum*	13–45	–
	large Indian breadroot	PEES	*Pediomelum esculentum*	13–45	–
	beardtongue	PENST	*Penstemon*	13–45	–
	spiny phlox	PHHO	*Phlox hoodii*	13–45	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	13–45	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	13–45	–
	prairie thermopsis	THRH	*Thermopsis rhombifolia*	13–45	–
	American vetch	VIAM	*Vicia americana*	13–45	–
5	**Native forbs (toxic properties)**			1–3	
	twogrooved milkvetch	ASBI2	*Astragalus bisulcatus*	1–3	–
	larkspur	DELPH	*Delphinium*	1–3	–
	white locoweed	OXSE	*Oxytropis sericea*	1–3	–
	deathcamas	ZIGAD	*Zigadenus*	1–3	–
Shrub/Vine					

6	**Native shrubs and half-shrubs**			65–177	
	Shrub, broadleaf	2SB	*Shrub, broadleaf*	13–89	–
	silver sagebrush	ARCA13	*Artemisia cana*	13–89	–
	prairie sagewort	ARFR4	*Artemisia frigida*	13–89	–
	Wyoming big sagebrush	ARTRW8	*Artemisia tridentata ssp. wyomingensis*	13–89	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	13–89	–
	Nuttall's saltbush	ATNU2	*Atriplex nuttallii*	13–89	–
	rubber rabbitbrush	ERNAN5	*Ericameria nauseosa ssp. nauseosa var. nauseosa*	13–89	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	13–89	–
	prairie rose	ROAR3	*Rosa arkansana*	13–89	–
7	**Native shrubs and half-shrubs**			1–3	
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	1–3	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	1–3	–

Animal community

LIVESTOCK INTERPRETATIONS:

Managed livestock grazing is suitable on this site as it has the potential to produce an abundance of high quality forage. This is often a preferred site for grazing by livestock, and animals tend to congregate in these areas. In order to maintain the productivity of this site, grazing must be managed carefully on adjoining sites with less production to be sure livestock drift onto the Clayey site is not excessive. Management objectives should include maintenance or improvement of the plant community. Shorter grazing periods and adequate re-growth after grazing are recommended for plant maintenance and recovery. Heavy stocking and season-long use of this site can be detrimental and will alter the plant community composition and production over time.

Whenever Plant Communities 2A or 2B (Medium and short grasses) occur, grazing management strategies need to be implemented to avoid further deterioration. These communities are still stable, productive, and healthy provided they receive proper management. These communities will respond fairly quickly to improved grazing management, including increased growing season rest of key forage plants. Grazing management alone can usually move these communities back towards the potential community.

Plant Communities 3 and 4 have substantially reduced forage production, and a high percentage of aggressive, non-palatable species. Once these plant communities become established, it will be much more difficult to restore the site to a community that resembles the potential with grazing management alone. Additional growing season rest is often necessary for re-establishment of the desired species and to restore the stability and health of the site. Brush management and mechanical treatment are often needed to restore tall perennial grasses onto this site.

Plant Community 5 has extremely limited forage production (<225 lbs. per acre), and a high percentage of non-preferred species for cattle and sheep. Seeding may be necessary to restore desirable native perennial species.

Proper stocking rates should be incorporated into a grazing management strategy that protects the resource, maintains or improves rangeland health, and is consistent with management objectives. Safe stocking rates will be based on useable forage production, and should consider ecological condition and trend of the site, and past grazing use history.

Calculations used to determine a safe stocking rate are based on the amount of useable forage available,taking into account the harvest efficiency of the animal and the grazing strategy to be implemented. Average annual production must be measured or estimated to properly assess useable forage production and stocking rates.

Stocking rates are calculated from average forage production values using a 25% Harvest Efficiency factor for preferred and desirable plants, and 10% Harvest Efficiency for less desirable species. AUM calculations are based

on 915 pounds per animal unit month (AUM) for a 1,000-pound cow with calf up to 4 months. No adjustments have been made for site grazability factors, such as steep slopes, site inaccessibility, or distance to drinking water.

WILDLIFE INTERPRETATIONS:

The Clayey ecological site occurs over large acreages on the Northern Great Plains except where it is fragmented by conversion to cropland, which is significant in many areas. Habitat fragmentation of this site may have contributed to the decline of some “area sensitive” wildlife species, particularly such ground-nesting birds as the grasshopper sparrow. This site is home to a diverse native wildlife complex. Historically, huge herds of migratory bison and pronghorn as well as large numbers of sharp-tailed and sage grouse were probably the dominant “game” species in addition to a wide variety of ground-nesting songbirds, waterfowl and shorebirds, small mammals and mammalian predators. Grazing patterns, topographic diversity, extensive acreages and interspersion with other ecological sites provide niches for numerous wildlife species. Small mammal diversity and abundance is high which, in turn, supports a varied raptor population. Historically, vast prairie dog towns provided habitat for such species as the black-footed ferret, burrowing owl, mountain plover, ferruginous hawk, and swift fox. Invasive plant species such as leafy spurge, Canada thistle and several knapweeds contribute to a loss of biodiversity within this ecological site. Wildlife water requirements are provided by springs and seeps, intermittent and perennial streams and, in modern times, numerous artificial ponds and livestock pipelines. These areas are locally important for northern leopard frogs, tiger salamanders, and a number of toad species, all of which feed on a variety of insects. Grazing, fire, drought cycles, and insect population fluctuations create a shifting mosaic of wildlife habitats across this site.

Plant Community 1: Tall Grasses/ Forbs/ Shrubs (HCPC):
The diversity of plant species and life forms provides feeding substrate for a variety of pollinating insects. Grasshopper and Morman cricket infestations occasionally consume the majority of the herbaceous vegetation, especially during drought years. A variety of warm and cool water fish species inhabit the intermittent and perennial streams associated with this community. Northern pike, lake chub, carp, a variety of suckers and walleye are examples. Common reptile and amphibian species include tiger salamanders in ponds and stock tanks, Woodhouse’s toad, western chorus frogs, bull snakes, rattlesnakes, and three species of garter snakes. The diversity of grass stature and life forms, along with scattered shrubs and a variety of forbs, provides habitat for many bird species including the upland sandpiper, loggerhead shrike, grasshopper and savanna sparrow, chestnut-collared longspur and western meadowlark. This community is especially favorable for ground-nesting birds because of the abundant residual plant material and litter available for nesting, escape and thermal cover. Diverse prey populations are available for raptors such as ferruginous and Swainson’s hawks. When this plant community is adjacent to large blocks of sagebrush-grassland, it can provide quality sage grouse lek sites and brood habitat. The predominance of grasses plus a diversity of forbs, shrubs and half-shrubs in this community favors grazers and mixed feeders such as bison, pronghorn and elk. Complex plant structural diversity and litter cover provide habitat for a wide array of small mammals (both seed eaters, i.e., deer mice and herbivores, i.e., voles and jackrabbits) and neotropical migratory birds.

Plant Community 2A: Medium and Short Grasses and Sedges / Shrubs and Half-shrubs:
The decline in forb diversity reduces the variety of pollinating insects compared to the HCPC or PPC although insects may be quite abundant in this community. Wyoming big sagebrush, with canopy cover of 15-30%, and an understory of grasses and forbs, is excellent nesting, winter, brood-rearing and foraging habitat for sage grouse. Other obligate sagebrush-grassland species, notably Brewer’s sparrow, also benefit from an increase in sagebrush cover. When residual grass and litter cover decrease in this community, ground nesting bird habitat values decline. This community often provides important winter range for mule deer and pronghorn. The sagebrush crowns break up hard crusted snow and provide about 15% protein and 40-60% digestibility for ungulates. Small mammal species composition may shift toward seed eaters such as the
deer mouse and away from herbivores like the sagebrush vole.

Plant Community 2B: Medium and Short Grasses:
The diversity of insect pollinators may be reduced as desirable forbs are replaced by more aggressive species. The partial loss of structural diversity makes this plant community somewhat less attractive to the variety of wildlife species using the HCPC. A decrease in residual plant material and litter cover is usually associated with degradation of the HCPC, which makes this community less attractive for ground-nesting birds. Pronghorn make considerable use of this type because of forb and half-shrub availability in the generally open landscape.

Plant Community 3: Short Grasses/ Shrubs and Half-shrubs:

Insect variety is considerably reduced at this stage because palatable forbs are mostly absent. Insects, particularly grasshoppers, may be very abundant during high points in population cycles. Heavy stands of big sagebrush can provide winter cover and foraging habitat for mule deer, elk, pronghorn and sage grouse. However, a decline in herbaceous cover and litter reduces overall wildlife species diversity and habitat value for amphibians, ground-nesting birds and small mammals. Prairie dogs will have an easier time establishing and expanding towns in this community to the benefit of burrowing owls, mountain plovers, and black-footed ferrets.

Plant Community 4: Short Grasses/ Half-shrubs/ Biennial Forbs:
Insect diversity is considerably lower than in higher seral communities and population fluctuations of grasshoppers may be extreme. Amphibian habitat is degraded following loss of litter cover and resulting warming and drying of the soil. Ground-nesting bird habitat value is significantly reduced because of lack of ground cover and residual vegetation in spring. Some species, such as the mountain plover and horned lark, may nest on the open ground surface. Pronghorn may forage on fringed sagewort, but big game habitat value is poor following loss of desirable forbs and grasses.

Plant Community 5: Short Grasses/ Half-shrubs/ Cactus/ Annual Grasses and Forbs: Insect populations fluctuate wildly and are represented by fewer species than higher seral communities. Amphibian habitat is very poor on the hot, dry ground surface. When big sagebrush cover exceeds about 15%, this community may provide winter sage grouse habitat; nest cover for sage grouse and most other ground-nesting birds is poor because of a lack of standing herbaceous material and surface litter. Lek sites for sage and sharp-tailed grouse may be available in this type. General wildlife habitat is of low value. Shrubs and half-shrubs provide some winter range value for pronghorn and mule deer.

Hydrological functions

The runoff potential for this site is low to moderate, depending on slope and ground cover/health. Runoff curve numbers generally range from 78 to 90. The soils associated with this ecological site are generally in Hydrologic Soil Group C and D. Soils have a slow infiltration rate when thoroughly wetted and consist chiefly of soils with moderately fine to fine textures.

Recreational uses

This site provides some recreational opportunities for hiking, horseback riding, big game and upland bird hunting. The forbs have flowers that appeal to photographers. This site provides valuable open space and visual aesthetics. Caution should be used during wet weather periods.

Wood products

None

Other information

The following is an example of how to calculate the recommended stocking rate. This example does not use production estimates from this specific ecological site. You will need to adjust the annual production values and run the calculations using total annual production values from the ecological sites encountered on each individual ranch/pasture. Before making specific recommendations, an on-site evaluation must be made.

Example of total annual production amounts by type of year:
Favorable years = 2200 lbs/acre
Normal years = 1480 lbs/acre
Unfavorable years = 1200 lbs/acre

It is recommended that on slopes of 30% or less, stocking rate should be derived from the total annual production pounds minus 500 pounds for residual dry matter and 25% harvest efficiency. On slopes over 30%, stocking rate is derived from total annual production pounds minus 800 pounds for residual dry matter and 25% harvest efficiency.

Refer to the NRCS National Range and Pasture Handbook for a list of Animal Unit Equivalents.

Sample Calculations using Favorable Year production amounts:

< 30% slopes: AUM/AC = [(2200-500)(0.25)]/915 lbs/month for one AU = 0.46 AUM/AC
AC/AUM = (1.0 AU)/(0.46AUM/AC) = 2.2 AC/AUM

> 30% slopes: AUM/AC = [(2200-800)(0.25)]/915 lbs/month for one AU = 0.38 AUM/AC
AC/AUM = (1.0 AU)/(0.38 AU! M/AC) = 2.6 AC/AUM

NOTE: 915 lbs/month for one Animal Unit is used as the baseline for maintenance requirements. This equates to 30 lbs/day of air-dry forage (1200 lb cow at 2.5% of body weight).

Inventory data references

Supporting Data for Site Development:
NRCS Production & Composition Record for Native Grazing Lands (Range-417): 10

BLM Soil & Vegetation Inventory Method (SVIM) Data: 2

NRCS Range Condition Record (ECS-2): 25

NRCS Range/Soil Correlation Observations & Soil 232 notes: 25

Ecological Site Reference: NRCS 417 No.: Wheatland County 503, Golden Valley County 504

Field Offices where this site occurs within the state:

Big Sandy
Big Timber
Billings
Chinook
Columbus
Crow Agency
Fort Belknap
Hardin
Harlowton
Joliet
Lewistown
Malta
Roundup
Stanford
White Sulphur Springs
Winnett

Other references

Site Documentation:

Authors:

Original: NRCS, 1983.

Revised: Matthew J. Ricketts, Robert E. Leinard, Rhonda Sue Noggles, Peter O. Husby, 2003

Contributors

MJR, REL, RSN, POH
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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)	Matt Ricketts, Loretta Metz
Contact for lead author	
Date	04/14/2005
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 evident in the reference state.

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2. **Presence of water flow patterns:** Water flow patterns are generally not evident in the reference state. Following heavy thunderstorms, short (less than 1.5 feet), sinuous, discontinuous flow patterns may be apparent.

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3. **Number and height of erosional pedestals or terracettes:** Wind and water erosion should not be evident in the reference state.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is less than 20% in the reference state. In HCPC, bare ground should not exceed 8%.

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5. **Number of gullies and erosion associated with gullies:** Gully erosion is not evident in the reference state.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** Wind scours, blowouts and/or depositional areas are not evident in the reference state.

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7. **Amount of litter movement (describe size and distance expected to travel):** Litter movement varies by size and depth of litter. In the reference state, litter should be coarse, anywhere from 1.5 inches up to 4 inches in length, and will not move more than a couple of inches from where it originated.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Stability values of 4-5 in plant interspaces. Stability values of 5-6 under plant canopies and at plant bases.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** The soil surface is moderate or strong granular. Organic matter is 2-3%. The A-horizon is 4 to 8 inches thick.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Deep-rooted native perennial grasses optimize infiltration and runoff. Grasses should be spaced approximately 1-1.5 feet apart in the reference state.

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 present in reference state.

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: Native cool season, mid-grasses >> cool season, short-grasses > shrubs >or = perennial forbs = cool season, rhizomatous grasses.

    Sub-dominant:

    Other:

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Plant mortality is very low; decadence is minimal except in prolonged periods of drought.

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):** 1160 - 1580 #/acre.

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:** plains pricklypear, broom snakeweed, cheatgrass, Japanese brome, curlycup gumweed, blue grama (in amounts greater than 350 pounds/acre, or canopy cover values greater than 30%), fringed sagewort, cudweed

sagewort.

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17. **Perennial plant reproductive capability:** This is not impaired in the reference state.
