USDA Natural Resources Conservation Service

Ecological site R058AC049MT
Silty-Steep (SiStp) RRU 58A-C 11-14" p.z. (combined R058AC046MT, R058AC047MT & R058AC048MT into this site)

Last updated: 6/14/2023
Accessed: 06/30/2024

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.

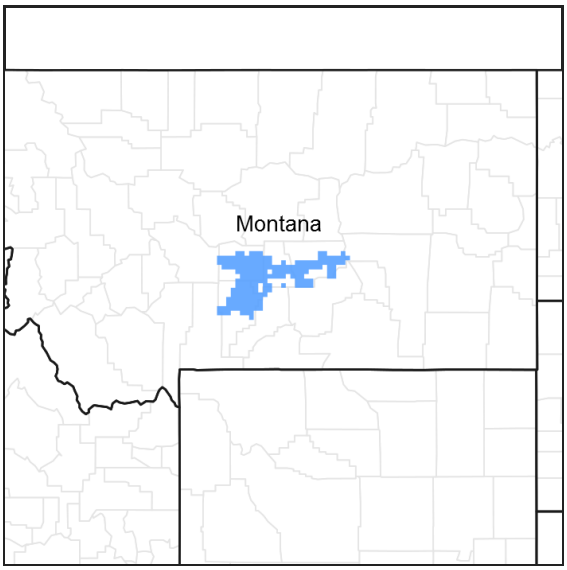

Figure 1. Mapped extent

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.

Associated sites

R058AC040MT	**Silty (Si) RRU 58A-C 11-14" p.z.**
R058AC041MT	**Clayey (Cy) RRU 58A-C 11-14" p.z.**
R058AC042MT	**Sandy (Sy) RRU 58A-C 11-14" p.z.**
R058AC057MT	**Shallow (Sw) RRU 58A-C 11-14" p.z.**

Similar sites

R058AC041MT	**Clayey (Cy) RRU 58A-C 11-14" p.z.** The Silty, Clayey, and Sandy sites differ by being mainly on slopes less than 15%.
R058AC059MT	**Shallow Clay (SwC) RRU 58A-C 11-14" p.z.** The Shallow Clay site differs mainly by being 20 inches or less to shale or other root limiting material.
R058AC194MT	**Shallow to Gravel (SwGr) RRU 58A-C 11-14" p.z.** The Shallow and Shallow to Gravel sites may have similar textures, but will be shallow (20 inches or less) to bedrock or semi-consolidated sedimentary beds.

R058AC040MT	**Silty (Si) RRU 58A-C 11-14" p.z.** The Silty, Clayey, and Sandy sites differ by being mainly on slopes less than 15%.
R058AC042MT	**Sandy (Sy) RRU 58A-C 11-14" p.z.** The Silty, Clayey, and Sandy sites differ by being mainly on slopes less than 15%.
R058AC057MT	**Shallow (Sw) RRU 58A-C 11-14" p.z.** The Shallow and Shallow to Gravel sites may have similar textures, but will be shallow (20 inches or less) to bedrock or semi-consolidated sedimentary beds.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This ecological site occurs on moderately steep to steep sedimentary plains, hills, and hill slopes. Slope aspect can occur in all directions, and can be significant.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Plain (3) Ridge
Elevation	2,250–4,500 ft
Slope	15–45%
Water table depth	60 in
Aspect	E, S, W

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 (average)	135 days
Freeze-free period (average)	155 days
Precipitation total (average)	14 in

Influencing water features

Soil features

These soils are moderately deep to very deep loamy, granular clayey, or sandy soils on steep or hilly landscapes. Permeability is mostly moderate with some being moderately slow, and effective rooting depth is greater than 20 inches. The major limitation to plant growth is the reduced effective moisture due to slope, and the potential for runoff. Available Water Holding Capacity to 40 inches is 4 to 8 inches on the silty and clayey soils, and 4 to 6 inches on the sandy soils.

Table 4. Representative soil features

Surface texture	(1) Loam (2) Clay (3) Sand
Permeability class	Moderately slow to moderate
Soil depth	40–72 in
Surface fragment cover <=3"	0–15%
Available water capacity (0-40in)	4–8 in

Ecological dynamics

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

State and transition model

Ecosystem states

1. Plant Community 1: Tall and Medium Grasses/ Forbs/ Shrubs

2. Plant Community 1A: Silty soils

3. Plant Community 1B: Clayey soils

4. Plant Community 1C: Sandy soils

5. Plant Community 2: Medium and Short Grasses/ Shrubs and Half-shrubs

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

7. Plant Community 4: Short Grasses/ Annual Grasses and Forbs/ Half-shrubs

State 1 submodel, plant communities

1.1. Plant Community 1: Tall and Medium Grasses/ Forbs/ Shrubs

State 2 submodel, plant communities

2.2. Plant Community 1A: Silty soils

State 3 submodel, plant communities

3.3. Plant Community 1B: Clayey soils

State 4 submodel, plant communities

4.4. Plant Community 1C: Sandy soils

State 5 submodel, plant communities

5.5. Plant Community 2: Medium and Short Grasses/ Shrubs and Half-shrubs

State 6 submodel, plant communities

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

State 7 submodel, plant communities

7.7. Plant Community 4: Short Grasses/ Annual Grasses and Forbs/ Half-shrubs

State 1
Plant Community 1: Tall and Medium Grasses/ Forbs/ Shrubs

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

The physical aspect of this site in Historical Climax is that of grassland dominated by cool and warm-season grasses with scattered shrub cover. Approximately 80–85% of the annual production is from grasses and sedges, 5–10% from forbs, and 5–10% is from shrubs and half-shrubs. The canopy cover of shrubs is 5 to 10%. Slight differences in production and plant species composition will occur depending on the surface texture of the site (silty, clayey, or sandy).

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	930	1060	1190
Shrub/Vine	85	95	105
Forb	85	95	105
Total	**1100**	**1250**	**1400**

Table 6. Ground cover

Tree foliar cover	0%

Shrub/vine/liana foliar cover	1-15%
Grass/grasslike foliar cover	50%
Forb foliar cover	1-10%
Non-vascular plants	0%
Biological crusts	0-3%
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	5-12%
Forb basal cover	1-4%
Non-vascular plants	0%
Biological crusts	1-2%
Litter	40-60%
Surface fragments >0.25" and <=3"	0-15%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	15-30%

Table 8. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	–	–	1-10%
>0.5 <= 1	–	–	–	–
>1 <= 2	–	1-15%	50-80%	–
>2 <= 4.5	–	–	–	–
>4.5 <= 13	–	–	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

State 2
Plant Community 1A: Silty soils

Community 2.1
Plant Community 1A: Silty soils

Dominant species include bluebunch wheatgrass, green needlegrass, western or thickspike wheatgrass, plains muhly, and needleandthread. Short grasses such as Sandberg bluegrass and prairie junegrass also occur. There are abundant forbs (purple and white prairie clovers, prairie coneflower, dotted gayfeather) which occur in smaller percentages. Shrubs such as Wyoming big sagebrush and winterfat are common.

State 3
Plant Community 1B: Clayey soils

Community 3.1
Plant Community 1B: Clayey soils

Dominant species include western wheatgrass, green needlegrass, and bluebunch wheatgrass. Short grasses such as Sandberg bluegrass and blue grama also occur. There are abundant forbs (purple and white prairie clovers, prairie coneflower, dotted gayfeather) which occur in smaller percentages. Nuttall's saltbush and winterfat are the dominant shrubs.

State 4
Plant Community 1C: Sandy soils

Community 4.1
Plant Community 1C: Sandy soils

Dominant species include prairie sandreed, Indian ricegrass, bluebunch wheatgrass, thickspike wheatgrass, and needleandthread. Threadleaf sedge and sand dropseed also occur. There are abundant forbs (purple and white prairie clovers, prairie coneflower, dotted gayfeather) which occur in smaller percentages. Skunkbush sumac and yucca are the dominant shrubs. These plant communities are well adapted to the Northern Great Plains climatic conditions. The diversity in plant species and the presence of tall, deep-rooted perennial grasses allows for moderately high drought tolerance, considering the limited available water holding capacity of the site. Individual species can vary greatly in production depending on growing conditions (timing and amount of precipitation and temperature). Plants on this site have strong, healthy root systems that allow production to increase significantly with favorable precipitation. 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.

State 5
Plant Community 2: Medium and Short Grasses/ Shrubs and Half-shrubs

Community 5.1
Plant Community 2: Medium and Short Grasses/ Shrubs and Half-shrubs

This community is the result of shifts in climate and disturbances such as grazing. Dominants include needleandthread, western/ thickspike wheatgrass, sedges, threadleaf sedge, blue grama, and prairie junegrass. Bluebunch wheatgrass, green needlegrass, and prairie sandreed (sandy soils) will still be present but in smaller amounts. There may be an increase in the amount of fringed sagewort, Wyoming big sagebrush, or yucca. Palatable and nutritious forbs will be replaced by less desirable and more aggressive species. Grass biomass production and litter become reduced on Community 2 as the taller grasses become less prevalent, increasing evaporation and reducing moisture retention. Additional open space in the community can result in undesirable invader species. This plant community provides for moderate soil stability.

State 6
Plant Community 3: Short and Medium Grasses/ Half-shrubs and Shrubs

Community 6.1
Plant Community 3: Short and Medium Grasses/ Half-shrubs and Shrubs

This is a disturbance induced community, with dominants including threadleaf sedge, prairie junegrass, blue grama,

Sandberg bluegrass, perennial forbs, fringed sagewort, and Wyoming big sagebrush. Remnant amounts of western or thickspike wheatgrass and needleandthread may be present. Tall grasses and palatable forbs will be mostly absent. Red threeawn, broom snakeweed, yucca, and annual grasses may begin to invade the site. Plant Community 3 is much less productive than Plant Communities 1 or 2, and has lost many of the attributes of a healthy rangeland. The loss of deep perennial root systems reduces total available moisture for plant growth. Reduction of plant litter will result in higher surface soil temperatures and increased evaporation losses. Annual species are often aggressive and competitive with seedlings of perennial plants. This community can respond positively to improved grazing management, but it will take additional inputs to move it towards a community similar in production and composition to that of Plant Community 1 or 2.

State 7
Plant Community 4: Short Grasses/ Annual Grasses and Forbs/ Half-shrubs

Community 7.1
Plant Community 4: Short Grasses/ Annual Grasses and Forbs/ Half-shrubs

This community is the result of continual adverse disturbances. Dominants include Japanese brome, threadleaf sedge, prairie junegrass, blue grama, red threeawn, fringed sagewort, broom snakeweed, and weedy forbs. Plant community 4 has extremely reduced production of native plants (< 600 lbs./acre). The lack of litter and short plant heights result in higher soil temperatures, poor water infiltration rates, and increased evaporation, which gives short sod grasses and annual invaders a competitive advantage over the cool season tall and medium grasses. This community has lost many of the attributes of a healthy rangeland, including good infiltration, minimal erosion and runoff, nutrient cycling and energy flow. Significant economic inputs and time would be required to move this plant community towards a higher successional stage and a more productive plant community.

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 grasses**			870–1050	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	440–840	–
	prairie sandreed	CALO	*Calamovilfa longifolia*	0–420	–
	green needlegrass	NAVI4	*Nassella viridula*	55–280	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	55–210	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	0–210	–
	tufted wheatgrass	ELMA7	*Elymus macrourus*	0–140	–
	western wheatgrass	PASM	*Pascopyrum smithii*	0–140	–
	plains muhly	MUCU3	*Muhlenbergia cuspidata*	0–70	–
	squirreltail	ELEL5	*Elymus elymoides*	0–55	–
2	**Native grasses and sedges**			11–140	
	Grass, perennial	2GP	*Grass, perennial*	11–70	–
	blue grama	BOGR2	*Bouteloua gracilis*	11–70	–
	needleleaf sedge	CADU6	*Carex duriuscula*	11–70	–
	threadleaf sedge	CAFI	*Carex filifolia*	11–70	–
	plains reedgrass	CAMO	*Calamagrostis montanensis*	11–70	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	11–70	–
	Sandberg bluegrass	POSE	*Poa secunda*	11–70	–
3	**Native grasses**			0–1	

	Fendler's threeawn	ARPUF	*Aristida purpurea var. fendleriana*	0–1	–
Forb					
4	**Native forbs**			55–140	
	Forb, perennial	2FP	*Forb, perennial*	11–70	–
	common yarrow	ACMI2	*Achillea millefolium*	11–70	–
	onion	ALLIU	*Allium*	11–70	–
	pussytoes	ANTEN	*Antennaria*	11–70	–
	tarragon	ARDR4	*Artemisia dracunculus*	11–70	–
	milkvetch	ASTRA	*Astragalus*	11–70	–
	purple prairie clover	DAPU5	*Dalea purpurea*	11–70	–
	buckwheat	ERIOG	*Eriogonum*	11–70	–
	hairy false goldenaster	HEVI4	*Heterotheca villosa*	11–70	–
	Lewis flax	LILE3	*Linum lewisii*	11–70	–
	dotted blazing star	LIPU	*Liatris punctata*	11–70	–
	desertparsley	LOMAT	*Lomatium*	11–70	–
	spiny phlox	PHHO	*Phlox hoodii*	11–70	–
	scurfpea	PSORA2	*Psoralidium*	11–70	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	11–70	–
	prairie thermopsis	THRH	*Thermopsis rhombifolia*	11–70	–
	American vetch	VIAM	*Vicia americana*	11–70	–
5	**Native forbs (toxic properties)**			0–1	
	twogrooved milkvetch	ASBI2	*Astragalus bisulcatus*	0–1	–
	larkspur	DELPH	*Delphinium*	0–1	–
	white locoweed	OXSE	*Oxytropis sericea*	0–1	–
	deathcamas	ZIGAD	*Zigadenus*	0–1	–
Shrub/Vine					
6	**Native shrubs and half-shrubs**			55–140	
	Shrub, broadleaf	2SB	*Shrub, broadleaf*	11–70	–
	prairie sagewort	ARFR4	*Artemisia frigida*	11–70	–
	Wyoming big sagebrush	ARTRW8	*Artemisia tridentata ssp. wyomingensis*	11–70	–
	Nuttall's saltbush	ATNU2	*Atriplex nuttallii*	11–70	–
	rubber rabbitbrush	ERNAN5	*Ericameria nauseosa ssp. nauseosa var. nauseosa*	11–70	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	11–70	–
	prairie rose	ROAR3	*Rosa arkansana*	11–70	–
	soapweed yucca	YUGL	*Yucca glauca*	11–70	–
7	**Native shrubs and half-shrubs**			0–1	
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	0–1	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	0–1	–

Animal community

Livestock Grazing Interpretations:

Managed livestock grazing is suitable on this site as it has the potential to produce a moderate amount of high quality forage. Forage production is somewhat limited by steep slopes and the potential for runoff, reducing the effectiveness of the precipitation received for plant growth. The steeper slopes may also limit livestock travel and result in poor grazing distribution, especially in areas away from water. 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. Non-prescribed grazing over a period of years will be detrimental to the site as it will alter the plant community composition and productivity.

Whenever Plant Community 2 (Medium and short grasses) occurs, 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.

Wildlife Interpretations:

The Silty-Steep ecological site often adds topographical and vegetative complexity to an otherwise fairly uniform landscape. This provides for increased variety of wildlife habitat niches and cover types. The general area offers thermal and escape cover for big game animals as well as a variety of other wildlife species. Shrub availability on steep, south slopes often provides important winter range for mule deer and elk. Abundant prey and perch sites (i.e. on rock outcrops) attract a variety of raptors. Golden eagles often hunt low to the ground along the steep side hills characteristic of this site where they can surprise small mammals as they cruise over small drainages. Noxious weeds, such as spotted knapweed and leafy spurge, commonly reduce vegetative diversity of the Silty-Steep ecological site. The interface of sandy and shale geologic substrates may result in seeps forming on side hills and toe slopes. These are an important water source for wildlife as well as a source of biodiversity.

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

The diversity of forbs, half-shrubs and shrubs provides feeding substrate for a variety of pollinating insects, which are prey for many birds, reptiles and small mammals. Springs and seeps are habitat for amphibians such as tiger salamanders. The short-horned lizard is a representative reptile. The diversity of plant species and life forms, in combination with topographic variation, provides high quality bird habitat. Lark sparrows, mountain bluebirds and golden eagles are examples of birds using this community. The high proportion of grasses and grass-like plants supports grazers and mixed feeders such as bison and elk. A diversity of forbs and shrubs provides for browsers and selective feeders such as mule deer and pronghorn. Large animal nutrition levels are relatively high because of plant species and life form diversity. Winter range value is often high for big game species when topographic diversity provides south exposures and browse plants such as Gardner saltbush and winterfat are available. Small mammal diversity may be fairly high as a result of complex plant structural variety and ample litter cover. Example species include the kangaroo rat, deer mouse, meadow vole, olive-backed pocket mouse and desert cottontail.

Plant Community 2: Medium and Short Grasses/ Shrubs and Half-shrubs:

Pollinating insect diversity declines with the decrease in flowering plant variety and litter cover. Reptile populations are probably similar to the PPC. Trampling and over-grazing of seep areas degrades amphibian habitat. Ground nesting bird habitat value declines with the reduction in litter cover and residual plant material in spring. Structural habitat diversity for birds in general declines with the reduction in taller grasses and forb variety. Winter range value for big game is similar to the PPC as an increase in fringed sagewort and possibly big sagebrush partially compensate for some reduction in winterfat and Nuttall saltbush. Seed eating small mammals, such as the deer mouse, may be abundant; herbivorous rodents, like voles, are adversely affected by a loss of litter cover.

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

Pollinating insect diversity further declines as the forb community is simplified and soils become warmer and drier. Ground nesting bird habitat value is very poor. The ubiquitous deer mouse may still thrive in this community but small mammal diversity in general declines significantly. Big game animals lose a nutritional value on winter ranges with the loss of nutritious browse plants like winterfat, although an increase in big sagebrush on heavier soils may partially compensate in some areas. Seeps and springs are severely degraded from livestock trampling with a resulting loss of biodiversity in general and amphibian habitat specifically.

Plant Community 4: Short Grasses/ Annual grasses and Forbs/ Half-shrubs:

Wildlife habitat value is very poor in general. Insects (i.e. grasshoppers) may be very abundant during population highs but species diversity, especially of pollinators, is very low. Amphibian habitat around seeps and springs is severely degraded. Reptiles, such as the short-horned lizard, may still occur but their formerly diverse food supply is reduced. Topographic diversity still provides some thermal cover for big game animals but nutritional value is very limited because the higher value browse plants are gone. Small mammals are represented by very few species. The deer mouse, a seed eater, may be relatively abundant.

Hydrological functions

Silty and Clayey soils: The runoff potential for this site is high to very high, depending on slope and ground cover. Runoff curve numbers generally range from 77 to 92. The soils associated with this ecological site are generally in Hydrologic Soil Group C or D. The infiltration rates for these soils will normally be moderate to moderately slow.

Sandy soils: The soils associated with this ecological site are generally in Hydrologic Soil Group B. The infiltration rates for these soils will normally be moderate, to moderately rapid. The runoff potential for this site is low to high depending on slope and ground cover/health. Runoff curve numbers generally range from 65 to 83.

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 AUM/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

NRCS-Production & Composition Record for Native Grazing Lands (Range-417): 5

BLM-Soil & Vegetation Inventory Method (SVIM) Data: 10
NRCS-Range Condition Record (ECS-2): 10

NRCS-Range/Soil Correlation Observations & Soil 232 notes: 15

Ecological Site Reference: NRCS 417 No.: Wheatland County 507, Sweetgrass County 507

Other references

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

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)	Loretta Metz
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Approval date	

Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills are rare on slopes between 15–35% that are well-covered (90-95% cover) with live vegetation and litter. On slopes over 35%, plant cover, basal area and litter are generally reduced, and narrow rills approximately 5-10 feet in length may be apparent.

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2. **Presence of water flow patterns:** Will generally be rare on this site, but with the steeper slopes (>35%), and 15-30% bare ground, there may be areas which show accumulations of litter due to water movement, especially after severe storms.

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3. **Number and height of erosional pedestals or terracettes:** Wind and water erosion is rare on this site, but with the steeper slopes (>35%) there may be some plants with pedestals up to 0.5 inch in height.

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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 should not exceed 15% where slopes are approx 15-35%, and should not exceed 30% where slopes are over 35% slope when in the reference state.

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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:** These are not evident in the reference state.

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7. **Amount of litter movement (describe size and distance expected to travel):** Because there is little bare ground, litter movement will be minimal at most. Because the site is dominated by the taller bunchgrasses, litter size will reflect the height and diameter of the reproductive culms and leaves of these grasses as well as the lesser dominant mid-size grasses.

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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.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Organic matter in the A-horizon is between 0.5–2.0%. A-horizon is 2-4 inches thick in the reference state. Surface structure should be moderate or strong granular.

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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 1-3 feet apart in the reference state.

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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.

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

    Dominant: Cool season, mid-height, native perennial bunchgrasses > warm season, mid- and short- height native perennial bunchgrasses >> native shrubs = native perennial and annual forbs.

    Sub-dominant:

    Other:

    Additional:

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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.

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

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 1100 -1400 #/acre.

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** plains pricklypear, broom snakeweed, cheatgrass, Japanese brome, Wyoming big sagebrush, fringed sagewort, cudweed sagewort, blue grama (in excess of 300 pounds/acre, or canopy cover value >25%).

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