USDA Natural Resources Conservation Service

Ecological site R058AE017MT
Very Shallow (VSw) RRU 58A-E 10-14" p.z.

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.

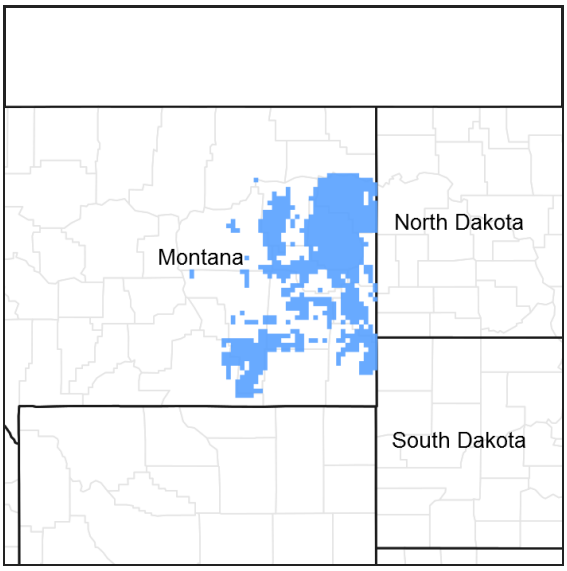


Figure 1. Mapped extent

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.

Associated sites

R058AE004MT	**Silty-Steep (SiStp) RRU 58A-E 10-14" p.z.**
R058AE019MT	**Shallow (Sw) RRU 58A-E 10-14" p.z.**

Similar sites

R058AE016MT	**Gravel (Gr) RRU 58A-E 10-14" p.z.** The Gravel site differs mainly in depth or texture.
R058AE019MT	**Shallow (Sw) RRU 58A-E 10-14" p.z.** The Shallow site differs by having a deeper soil profile over the root restricting layer, and having significantly more production.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This ecological site occurs mainly on ridge tops, escarpments, and upper side slopes. It often occurs in complex with other ecological sites. This site can occur on slopes ranging from nearly level to very steep and all exposures. Aspect can be significant, especially on steep and very steep slopes. Slight variations in plant community composition and production can result due to aspect. Runoff is an important feature of this site, adding to its droughtiness.

Table 2. Representative physiographic features

Landforms	(1) Alluvial fan (2) Ridge (3) Hill
Flooding frequency	None
Ponding frequency	None
Elevation	1,900–3,500 ft
Slope	0–70%
Water table depth	60 in

Climatic features

MLRAs 58A and 60B are 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 these MLRA's, 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.

MLRAs 58AE and 60BE have been divided into two distinct precipitation zones for the purpose of developing ecological site descriptions: 10–14" Mean Annual Precipitation (MAP) and 15–19" MAP.

10–14 inch zone:

The majority of the rangeland in these areas falls within the 11 to 13 inch 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 10-14 inch MAP (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)	145 days

Freeze-free period (average)	170 days
Precipitation total (average)	14 in

Influencing water features

Soil features

These soils are less than 10 inches deep to hard rock or soft beds of siltstone, sandstone, or shale. Few plant roots penetrate deeper than 10 inches. Cracks in the bed rock may allow deeper root penetration. Surface textures are variable. The soils associated with this site may include deep, fragmental soils that have a total water holding capacity of 2 inches or less.

Table 4. Representative soil features

Surface texture	(1) Very channery loam (2) Fine sandy loam
Family particle size	(1) Loamy
Drainage class	Excessively drained
Permeability class	Rapid
Soil depth	0–10 in
Available water capacity (0-40in)	0–2 in
Calcium carbonate equivalent (0-40in)	5–15%
Electrical conductivity (0-40in)	0 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	7.4–8.4

Ecological dynamics

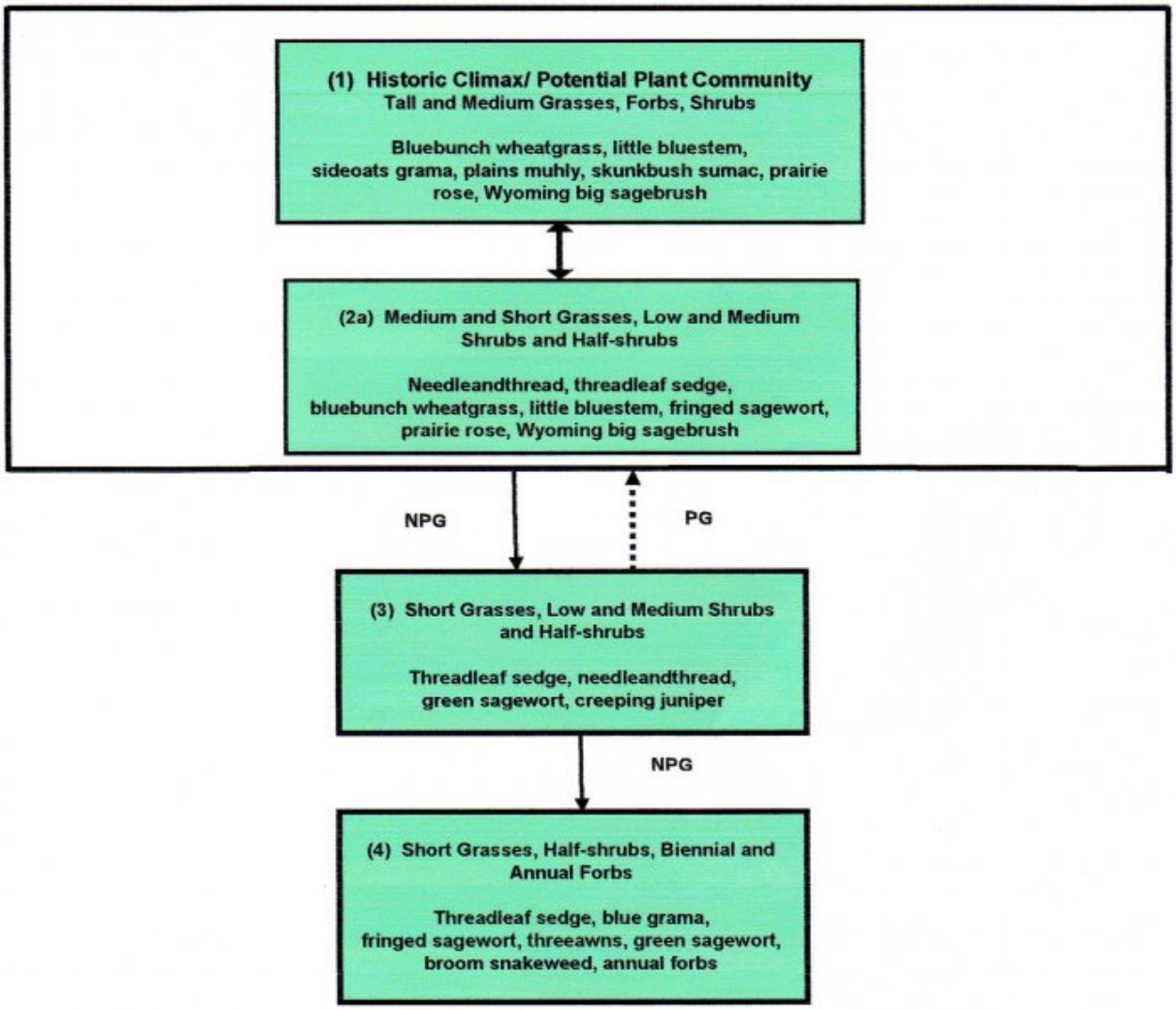
This site developed under Northern Great Plains climatic conditions, which included the natural influence of large herbivores and occasional fire. The plant community upon which interpretations are primarily based is the Historic Climax Plant Community (HCPC). This community is described as a reference to understand the original potential of this site, and is not always considered to be the management goal for every acre of rangeland. The following descriptions should enable the landowner or manager to better understand which plant communities occupy their land, and assist with setting goals for vegetation management. It can also be useful to understand the environmental and economic values of each plant community.

This site is considered moderately resilient to disturbance as it has only moderate soil limitations for plant growth. Changes may occur to the Historic Climax Plant Community due to management actions and/or climatic conditions. Under continued adverse impacts, a moderate decline in vegetative vigor and composition will occur. Under favorable vegetative management treatments, this site can more readily return to the Historic Climax Plant Community (HCPC).
Continual adverse impacts to the site over a period of years results in a departure from the HCPC, with a decrease of the taller, more palatable species such as bluebunch wheatgrass, little bluestem, sideoats grama, and plains muhly, and an increase in sedges, needleandthread, creeping juniper, and green sagewort.
Plants that are not a part of the climax community that are most likely to invade are annual grasses and forbs.

State and transition model

MLRA: 58A – Sedimentary Plains, East
MLRA: 60B – Pierre Shale Plains, East
R058AE017MT, R060BE586MT

Plant Communities and Transitional Pathways (diagram)



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.

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.

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

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

This is the interpretive plant community and is considered to be the Historic Climax Plant Community (HCPC) for this site. This plant community is dominated by tall and medium cool and warm season grasses (bluebunch wheatgrass, little bluestem, sideoats grama, and plains muhly). A few forbs occur in small percentages. Skunkbush

sumac is the predominant shrub that occurs. Annual production is low on this site due to low available water for plant growth. This plant community is 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.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	176	385	490
Shrub/Vine	62	137	175
Forb	12	28	35
Total	**250**	**550**	**700**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	15-25%
Grass/grasslike foliar cover	15-20%
Forb foliar cover	1-5%
Non-vascular plants	0%
Biological crusts	0-1%
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	1-5%
Grass/grasslike basal cover	5-10%
Forb basal cover	1-4%
Non-vascular plants	0%
Biological crusts	1-2%
Litter	10-15%
Surface fragments >0.25" and <=3"	10-15%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	40-50%

Table 8. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	–	–	–
>0.5 <= 1	–	–	–	–
>1 <= 2	–	15-25%	15-20%	1-5%
>2 <= 4.5	–	–	–	–
>4.5 <= 13	–	–	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

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

Community 2.1
Plant Community 2: Medium and Short Grasses/ Low and Medium Shrubs and Half-shrubs

Slight variations in the historical climax plant community result in a community where needleandthread increases slightly, bluebunch wheatgrass and little bluestem, decrease slightly, and short grasses and forbs may increase slightly. Grass biomass production and litter become reduced on the site as the taller grasses disappear, 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 3
Plant Community 3: Short Grasses/ Low and Medium Shrubs and Half-shrubs

Community 3.1
Plant Community 3: Short Grasses/ Low and Medium Shrubs and Half-shrubs

With continued heavy disturbance over time Community 2 tends to shift to one dominated by short grasses and less palatable medium grasses, (threadleaf sedge, needleandthread), and half shrubs green and fringed sagewort, and creeping juniper.

State 4
Plant Community 4: Short Grasses/ Half-shrubs/ Biennials and Annuals

Community 4.1
Plant Community 4: Short Grasses/ Half-shrubs/ Biennials and Annuals

With continued heavy disturbance over time Community 3 the plant community tends to become dominated by short grasses, annual grasses and forbs, and half shrubs. Bare ground increases substantially and forbs and soil erosion will occur, typically resulting in a significant amount of rosion "pavement". Species that tend to dominate the site include threadleaf sedge, blue grama, red and Fendler’s threeawn, green and fringed sagewort, broom snakeweed, and annuals. Plant communities 3 and 4 are less productive than Plant Communities 1 or 2. The lack of litter and short plant heights result in higher soil temperatures, poor water infiltration rates, and high evaporation, which gives short grasses a competitive advantage over the cool and warm 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. These communities will respond positively to improved grazing management, but significant economic inputs and time would be required to move them toward 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**			175–420	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	75–350	–
	little bluestem	SCSCS	*Schizachyrium scoparium var. scoparium*	50–210	–
	sideoats grama	BOCU	*Bouteloua curtipendula*	12–105	–
	prairie sandreed	CALO	*Calamovilfa longifolia*	0–70	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	12–70	–
	plains muhly	MUCU3	*Muhlenbergia cuspidata*	12–70	–
2	**Native grasses and sedges**			2–70	
	Grass, perennial	2GP	*Grass, perennial*	2–35	–
	blue grama	BOGR2	*Bouteloua gracilis*	2–35	–
	threadleaf sedge	CAFI	*Carex filifolia*	2–35	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	2–35	–
	western wheatgrass	PASM	*Pascopyrum smithii*	2–35	–
	Sandberg bluegrass	POSE	*Poa secunda*	2–35	–
Forb					
3	**Native forbs**			12–35	
	Forb, perennial	2FP	*Forb, perennial*	2–35	–
	tarragon	ARDR4	*Artemisia dracunculus*	2–35	–
	milkvetch	ASTRA	*Astragalus*	2–35	–
	white prairie clover	DACA7	*Dalea candida*	2–35	–
	purple prairie clover	DAPU5	*Dalea purpurea*	2–35	–
	blacksamson echinacea	ECAN2	*Echinacea angustifolia*	2–35	–
	buckwheat	ERIOG	*Eriogonum*	2–35	–
	hairy false goldenaster	HEVI4	*Heterotheca villosa*	2–35	–
	tufted evening primrose	OECAC2	*Oenothera caespitosa ssp. caespitosa*	2–35	–
	beardtongue	PENST	*Penstemon*	2–35	–
	spiny phlox	PHHO	*Phlox hoodii*	2–35	–
	scurfpea	PSORA2	*Psoralidium*	2–35	–
Shrub/Vine					
4	**Native shrubs and half-shrubs**			62–175	
	Shrub, broadleaf	2SB	*Shrub, broadleaf*	2–70	–
	prairie sagewort	ARFR4	*Artemisia frigida*	2–70	–
	Wyoming big sagebrush	ARTRW8	*Artemisia tridentata ssp. wyomingensis*	2–70	–
	shadscale saltbush	ATCO	*Atriplex confertifolia*	2–70	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	2–70	–
	rubber rabbitbrush	ERNAN5	*Ericameria nauseosa ssp. nauseosa var.*	2–70	–

			nauseosa		
	creeping juniper	JUHO2	*Juniperus horizontalis*	2–70	–
	Rocky Mountain juniper	JUSC2	*Juniperus scopulorum*	2–70	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	2–70	–
	skunkbush sumac	RHTR	*Rhus trilobata*	2–70	–
	prairie rose	ROAR3	*Rosa arkansana*	2–70	–
	soapweed yucca	YUGL	*Yucca glauca*	2–70	–
5	**Native shrubs and half-shrubs**			1–2	
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	1–2	–
	plains pricklypear	OPPO	*Opuntia polyacantha*	1–2	–

Animal community

Livestock Grazing Interpretations:

There are very limited amounts of suitable forage for livestock grazing on this site. The site may not produce shelter but the landform that it is in provides good shelter most of the time. 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 vegetation community. Short grazing periods and adequate re-growth after grazing are recommended for plant recovery. Season long use of this site can be detrimental, causing an increase in bare ground and altering the plant community over time.

Whenever Plant Community 2 occurs (medium and short grasses), grazing management strategies need to be implemented to avoid further deterioration. This community is still stable, productive, and healthy provided it receives proper management. This community will respond fairly quickly to improved grazing management including increased growing season rest of key forage plants. Grazing management alone can usually move this community back to one more similar to potential if a good seed source of the taller grasses still exists.
Plant Communities 3 or 4 have significantly reduced forage production (200–350 lbs./acre). Once this site is occupied by either Plant Communities 3 or 4, it will be more difficult to restore it to a community that resembles the potential with grazing management alone. Often, when this site is in this condition, there is a significant amount of erosion pavement/bare ground present.

Communities 3 and 4 have lost many of the attributes of a healthy rangeland, including good infiltration, minimal erosion and runoff, nutrient cycling and energy use. Additional growing season rest is often necessary for re-establishment of the desired species and to restore the stability and health of the site.

Mechanical treatment to improve site health is not feasible due to the shallow soils and steep slopes.

Wildlife Interpretations.

The following is a description of habitat values for the different plant communities that may occupy the site:

Plant Community 1 and 2: Tall Grasses/Forbs/Shrubs (HCPC):
The combination of vegetative diversity, slope variation and a tendency to occur in a complex with other ecological sites can produce significant wildlife habitat values. Steep south and west-facing slopes are often valuable as mule deer and elk winter range. The diversity of warm and cool season grasses and variety of shrubs and half-shrubs presents a long period of high nutrition for grazers and mixed feeders, even though the community is not highly productive. Rock outcrops and scattered junipers provide perch sites for raptors such as red-tailed and ferruginous hawks and golden eagles. Ground-nesting bird habitat values are generally low. Common nighthawks and mountain plovers may nest on the open, rocky surface. Songbirds such as rock wrens, chipping sparrows and spotted towhees may be found in this community. Small mammals are generally seed-eaters like deer mice, pocket mice and kangaroo rats.

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

The reduction/loss of warm season mid-grasses, bluebunch wheatgrass and desirable shrubs significantly degrades nutritive quality for ungulates. Loss of vegetative structural diversity results in relatively low songbird and small mammal habitat value. They prey base for raptors and mammalian predators is reduced.

Plant Community 4: Short Grasses/ Half shrubs/ Biennials and Annuals:
Wildlife habitat values are very limited in this community with the loss of plant species and structural diversity. Deer mice may make use of seed production from annual grasses and forbs.

Hydrological functions

The soils associated with this ecological site are generally in Hydrologic Soil Group A. The infiltration rates for these soils are highly variable, requiring an on-site evaluation. The runoff potential for this site is low to moderate, depending on slope and ground cover/health. Runoff curve numbers generally range from 54 to 73.

The hydrologic condition of this site has a significant affect on runoff. The hydrologic condition considers the effects of cover, including litter, and management on infiltration. Good hydrologic condition indicates that the site usually has a lower runoff potential.

Sites in low similarity (Plant Communities 3 and 4) are generally considered to be in less than good hydrologic condition. Sites in low similarity may have a high percentage of cover, but from shallow rooted species (e.g., threadleaf sedge). The deep root systems of the potential vegetation will help maintain or increase infiltration rates and reduce runoff.

Erosion is minor for sites in high similarity. Rills and gullies should not be present. Water flow patterns, if present, will be barely observable. Plant pedestals are essentially non-existent. Plant litter remains in place and is not moved by erosion. Soil surfaces should not be compacted or crusted.

For arid and semi-arid rangelands, good hydrologic conditions exist if cover (grass, litter, and brush canopy) is greater than 70%. Fair conditions exist when cover is between 30 and 70%, and poor conditions exist when cover is less than 30%. (Reference: Engineering Field Manual, Chapter 2 and Montana Supplement 4).

Recreational uses

This site provides recreational opportunities for big game and upland bird hunting, and hiking. The forbs have flowers that appeal to photographers. This site provides valuable open space and visual aesthetics. It supports sparse vegetation and recreational access is often difficult.

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): 6

BLM-Soil & Vegetation Inventory Method (SVIM) Data: 4

NRCS-Range Condition Record (ECS-2): 20

NRCS-Range/Soil Correlation Observations & Soil 232 notes: 9

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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)	T. DeCock; R Kilian
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Date	06/11/2104
Approved by	Jon Siddoway
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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2. **Presence of water flow patterns:** None on slopes less than 15%. On slopes 25 – 40% water flow patterns may be 3-4 feet long and 5 inches wide.

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3. **Number and height of erosional pedestals or terracettes:** No pedestals on slopes < 10%. On slopes 10 - 25% pedestals up to 0.5 inch high are common. No terracettes.

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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 < 50%. Bare ground will occur as small areas less than 10 inches in diameter.

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5. **Number of gullies and erosion associated with gullies:** Active gullies should not be present. Existing gullies should be “healed” with a good vegetative cover.

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

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7. **Amount of litter movement (describe size and distance expected to travel):** Plant litter remains in place and is not moved by erosional forces on slopes less than 10%. Herbaceous litter may move up to 4 inches on slopes > 10%.

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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):** Surface Soil Aggregate Stability under plant canopy should typically be 5 or greater. Surface Soil Aggregate Stability not under plant canopy should typically be 3 or greater.

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

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Plant canopy (50% maximum). Low grass canopy and basal cover and large gaps between plants allows significant raindrop impact and overland flow. A combination of shallow and deep rooted species has a positive effect on infiltration.

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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 would be expected except for the naturally occurring rooting restriction.

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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-stature, bunch grasses = Warm season, mid-stature, bunch grasses

    Sub-dominant: shrubs and half shrubs > Warm season, mid-stature, rhizomatous grasses = Cool season, short-stature, bunch grasses and sedges

    Other: Minor Components: Cool season, mid-stature, rhizomatous grasses = forbs = Warm season, short-stature, rhizomatous grasses and sedges = Warm season, tall stature, rhizomatous grasses

    Additional: (Blue grama should be grouped with warm season, short-stature, rhizomatous grasses due to its growth form)

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

decadence): Some plant mortality and decadence would be expected (10 – 15%).

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

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 625 to 700 #/acre (13 to 14 inch precip. Zone) 250 to 550 #/ac (10 to 12 inch precip. Zone).

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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:** Sulphur cinquefoil, Leafy spurge, knapweeds, whitetop, Dalmatian toadflax, St. Johnswort, perennial pepperweed.

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17. **Perennial plant reproductive capability:** All species are capable of reproducing.
