USDA Natural Resources
Conservation Service

Ecological site R058AC044MT
Subirrigated (Sb) RRU 58A-C 11-14" p.z.

Last updated: 6/14/2023
Accessed: 05/18/2024

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.

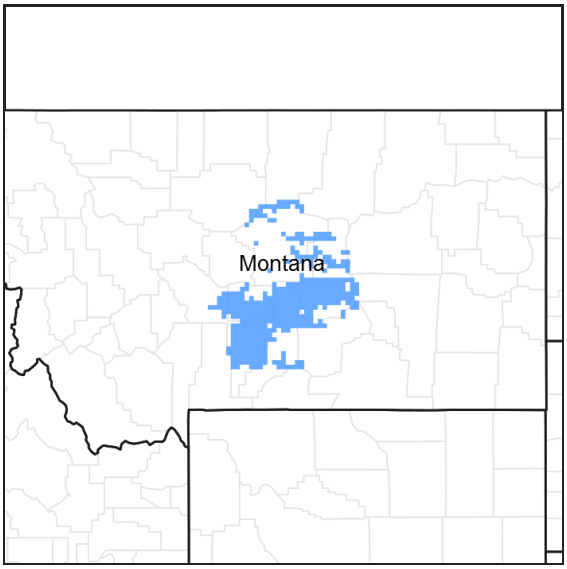


Figure 1. Mapped extent

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.**
R058AC043MT	**Wet Meadow (WM) RRU 58A-C 11-14" p.z.**
R058AC045MT	**Overflow (Ov) RRU 58A-C 11-14" p.z.**

Similar sites

R058AC043MT	**Wet Meadow (WM) RRU 58A-C 11-14" p.z.** The Wet Meadow site differs mainly by being wet at or near the soil surface for most of the growing season.
R058AC617MT	**Riparian Subirrigated (RSb) RRU 58A-C 11-14" p.z.** The Riparian Subirrigated site differs mainly by being adjacent to perennial or intermittent streams and being frequently flooded.
R058AC045MT	**Overflow (Ov) RRU 58A-C 11-14" p.z.** The Overflow site differs mainly by being associated with ephemeral streams and having no permanent water table.

R058AC619MT	**Saline Subirrigated (SSb) RRU 58A-C 11-14" p.z.** The Saline Subirrigated site differs mainly by being salt-affected.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This ecological site occurs on terraces
and high floodplain steppes, near springs or seeps, or other areas having a permanent water table close enough to the surface (typically within 3 feet)to influence plant composition and production. These areas are rarely or non-flooded. Rare flooding indicates that flooding is unlikely, but possible under unusual weather conditions (0–5% chance in any year). These are also considered to be “lentic” (standing water) riparian/wetland areas

Table 2. Representative physiographic features

Landforms	(1) Terrace (2) Hill (3) Flood-plain step
Flooding duration	Brief (2 to 7 days)
Flooding frequency	None to rare
Elevation	686–1,372 m
Slope	0–2%
Water table depth	0–91 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 (average)	135 days
Freeze-free period (average)	155 days
Precipitation total (average)	356 mm

Influencing water features

Soil features

These soils are non-hydric. They are mainly deep to very deep (>40”) with a permanent water table within about three feet of the surface. They are generally in the aquic moisture regime or aquic intergrade. Surface textures will vary- mainly loam, sandy loam, clay loam.

Table 4. Representative soil features

Surface texture	(1) Loam (2) Sandy loam (3) Clay loam
Drainage class	Poorly drained to somewhat poorly drained
Permeability class	Slow to very slow
Soil depth	102–183 cm
Surface fragment cover <=3"	0–5%
Soil reaction (1:1 water) (0-101.6cm)	6.6–8.4

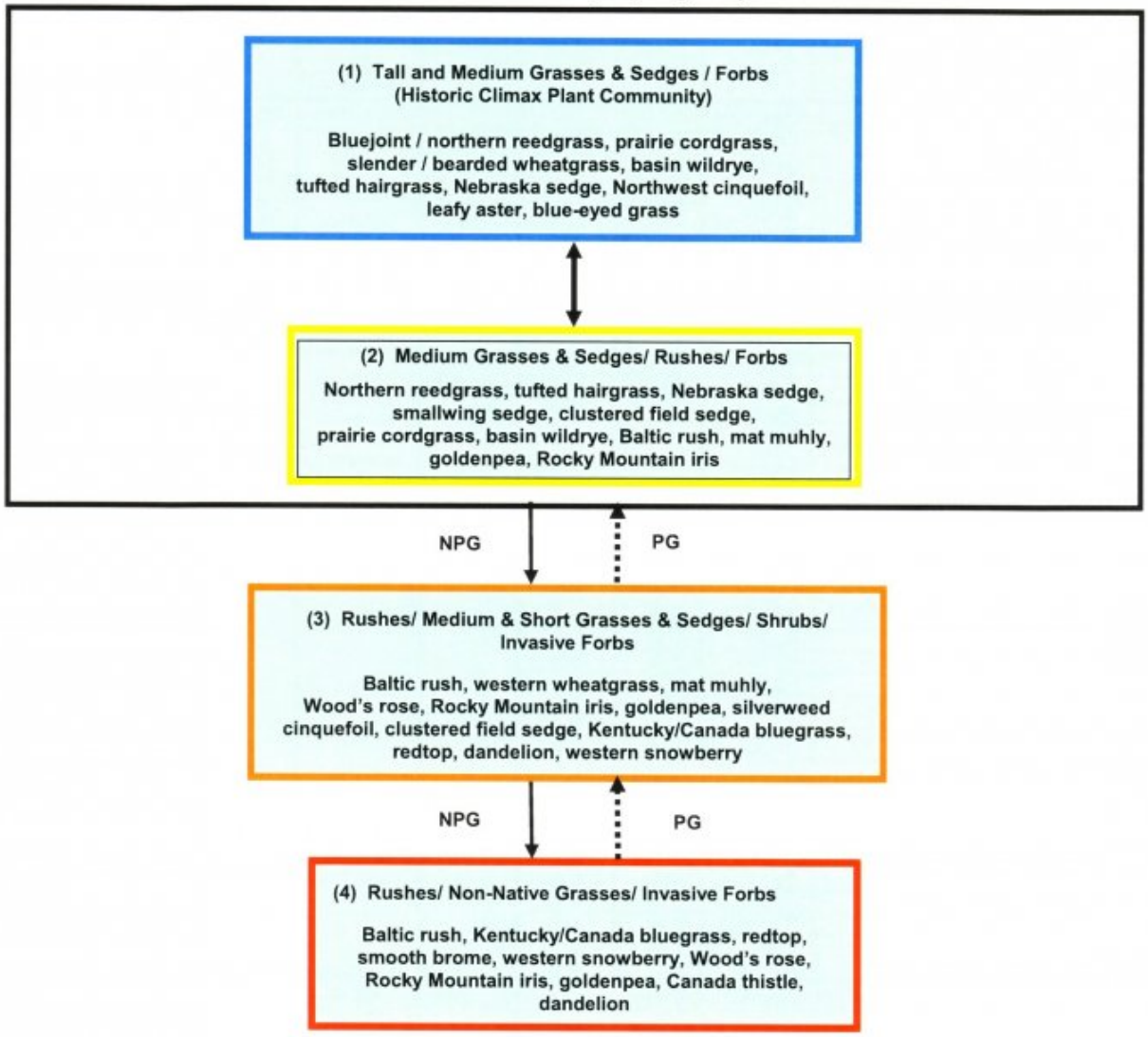
Ecological dynamics

The physical aspect of this site in Historical Climax (HCPC) is that of a level grassland dominated by cool and warm season grasses, sedges, and rushes with forbs occurring in smaller percentages. A few woody species, such as willows may be present. Approximately 50-60% of the annual production by weight is from grasses, 20-30% is from sedges and rushes, 5% is from forbs, and 5-10% may be from shrubs. Generally, willows that are present are mature plants, with very little reproduction except vegetative root sprouting.

State and transition model

MLRA: 58AC – Sedimentary Plains, Central
R058AC044MT

5c. 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. 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.

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

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

This is the interpretive plant community and is considered to be the Historic Climax Plant Community (HCPC) for this ecological site. The major species include basin wildrye, bluejoint and northern reedgrass, prairie cordgrass,

slender and bearded wheatgrass, tufted hairgrass, Nebraska sedge, and various rush species. There are several forbs that will occur in small amounts, including Northwest cinquefoil, leafy aster, and blue-eyed grass. This plant community is well adapted to the Northern Great Plains climatic conditions as well as the presence of a permanent water table. The diversity in plant species allows for drought tolerance. Individual species can vary greatly in production depending on growing conditions (timing and amount of precipitation, depth to the water table, and temperature). 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. The presence of available water throughout the growing season provides a very favorable soil-water-plant relationship. 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	3811	4046	4270
Shrub/Vine	420	443	460
Forb	185	196	224
Total	**4416**	**4685**	**4954**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	0-5%
Grass/grasslike foliar cover	80-90%
Forb foliar cover	1-10%
Non-vascular plants	0%
Biological crusts	0-5%
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	15-25%
Forb basal cover	1-5%
Non-vascular plants	0%
Biological crusts	0-5%
Litter	55-80%
Surface fragments >0.25" and <=3"	0-5%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	1-5%

Table 8. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	–	–	–
>0.15 <= 0.3	–	–	–	1-10%
>0.3 <= 0.6	–	0-5%	–	–
>0.6 <= 1.4	–	–	80-90%	–
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

State 2
Plant Community 2: Medium Grasses and Sedges/ Rushes/ Forbs

Community 2.1
Plant Community 2: Medium Grasses and Sedges/ Rushes/ Forbs

Slight disturbances to the site will tend to change the community to one dominated by medium height grasses (northern reedgrass, tufted hairgrass) and sedges (smallwing sedge, clustered field sedge). Most of the taller, more palatable grasses and sedges (basin wildrye, bluejoint reedgrass, prairie cordgrass, Nebraska sedge) will still be common, but in smaller percentages. Desirable and nutritious forbs will be replaced by less desirable and more aggressive species (Rocky Mountain iris, goldenpea). Short plants such as Baltic rush, meadow barley, and mat muhly will become more common. Grass biomass production and litter become reduced in 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 3
Plant Community 3: Rushes/ Medium and Short Grasses and Sedges/ Shrubs/ Invasive Forbs

Community 3.1
Plant Community 3: Rushes/ Medium and Short Grasses and Sedges/ Shrubs/ Invasive Forbs

As disturbance to the site increases, the community will tend to become dominated by Baltic rush and western wheatgrass, meadow barley, mat muhly, clustered field sedge. The taller grasses and sedges may still be present, but in much smaller amounts. Wood’s rose and western snowberry often become more abundant. Non-native grasses and forbs such as Kentucky or Canada bluegrass, redtop, Canada thistle, and dandelion often become more common. The non-native species will also be present if the water table lowers, such as during a prolonged drought. 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. Invasive 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 4
Plant Community 4: Rushes/ Non-Native Grasses; Invasive Forbs

Community 4.1
Plant Community 4: Rushes/ Non-Native Grasses; Invasive Forbs

With continued heavy disturbance, the community becomes dominated by Baltic rush. Non-native grasses and forbs

(Kentucky/Canada bluegrass, redtop, smooth brome, Canada thistle, and dandelion) will become dominant especially if the water table has lowered. There may still be small, remnant amounts of the taller grasses and sedges present. Nebraska sedge can often be persistent because of its extensive system of roots and rhizomes. Wood's rose and western snowberry will continue to be abundant. Plant community 4 has extremely reduced production of native plants (< 600 lbs. / acre). 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. This site is often seeded to introduced species for hay or pasture because of its productivity potential and level landscape. Reed canarygrass and "Garrison" creeping foxtail, often along with a legume such as clover or alfalfa, are common components. This plant community is often as productive as the HCPC but is no longer managed as rangeland. Once converted to introduced species, this community will take additional inputs (reseeding) to move it towards a community similar in production and composition to that of Plant Community 1 or 2.

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 and sedges**			3531–4214	
	basin wildrye	LECI4	*Leymus cinereus*	885–1732	–
	bluejoint	CACA4	*Calamagrostis canadensis*	661–1485	–
	northern reedgrass	CASTI3	*Calamagrostis stricta ssp. inexpansa*	661–1485	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	443–992	–
	beardless wheatgrass	PSSPI	*Pseudoroegneria spicata ssp. inermis*	443–992	–
	prairie cordgrass	SPPE	*Spartina pectinata*	443–992	–
	Nebraska sedge	CANE2	*Carex nebrascensis*	44–493	–
	Canada wildrye	ELCA4	*Elymus canadensis*	1–247	–
	shortawn foxtail	ALAE	*Alopecurus aequalis*	1–247	–
2	**Native grasses and sedges**			1–247	
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	1–247	–
	Grass, perennial	2GP	*Grass, perennial*	1–247	–
	clustered field sedge	CAPR5	*Carex praegracilis*	1–247	–
	meadow barley	HOBR2	*Hordeum brachyantherum*	1–247	–
	mat muhly	MURI	*Muhlenbergia richardsonis*	1–247	–
	western wheatgrass	PASM	*Pascopyrum smithii*	1–247	–
3	**Native annual grasses**			1–3	
	foxtail barley	HOJU	*Hordeum jubatum*	1–3	–
Forb					
4	**Native forbs**			44–247	
	Forb, perennial	2FP	*Forb, perennial*	1–247	–
	common yarrow	ACMI2	*Achillea millefolium*	1–247	–
	silverweed cinquefoil	ARAN7	*Argentina anserina*	1–247	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	1–247	–
	bedstraw	GALIU	*Galium*	1–247	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	1–247	–

	common cowparsnip	HEMA80	*Heracleum maximum*	1–247	–
	Rocky Mountain iris	IRMI	*Iris missouriensis*	1–247	–
	blue lettuce	LATA	*Lactuca tatarica*	1–247	–
	wild mint	MEAR4	*Mentha arvensis*	1–247	–
	wild bergamot	MOFI	*Monarda fistulosa*	1–247	–
	elephanthead lousewort	PEGR2	*Pedicularis groenlandica*	1–247	–
	slender cinquefoil	POGR9	*Potentilla gracilis*	1–247	–
	curly dock	RUCR	*Rumex crispus*	1–247	–
	mountain blue-eyed grass	SISA4	*Sisyrinchium sarmentosum*	1–247	–
	goldenrod	SOLID	*Solidago*	1–247	–
	alpine leafybract aster	SYFOF	*Symphyotrichum foliaceum var. foliaceum*	1–247	–
	goldenbanner	THERM	*Thermopsis*	1–247	–
Shrub/Vine					
5	**Native shrubs**			1–493	
	Shrub, broadleaf	2SB	*Shrub, broadleaf*	1–247	–
	American plum	PRAM	*Prunus americana*	1–247	–
	chokecherry	PRVI	*Prunus virginiana*	1–247	–
	golden currant	RIAU	*Ribes aureum*	1–247	–
	currant	RIBES	*Ribes*	1–247	–
	Woods' rose	ROWO	*Rosa woodsii*	45–247	–
	silver buffaloberry	SHAR	*Shepherdia argentea*	1–247	–
	snowberry	SYMPH	*Symphoricarpos*	45–247	–

Animal community

Livestock Grazing 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 due to the succulent forage, and animals tend to congregate in these areas. In order to maintain the productivity of this site, stocking rates must be managed carefully on adjoining sites with less production to be sure livestock drift onto the Subirrigated 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.

Grazing this site when the upper part of the soil is wet can cause compaction. Hummocking (frost heaving) is often a feature of this site. The hummocking can be exacerbated if grazing impact becomes excessive.

Whenever Plant Community 2 (medium and short grasses and sedges) occurs, 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 since a good seed source of the taller grasses should still exist.

Plant Communities 3 and 4 have severely reduced forage production, and contain a high percentage of non-palatable species. Once this site is occupied by these communities, the presence of non-native grasses and undesirable plants will make it more difficult to restore it 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.

Once established, plants such as Kentucky bluegrass, smooth brome, and Canada thistle are stable and very difficult to remove by grazing alone. The potential for using seeding or mechanical treatment to improve site health can be limited, depending on the depth to the water table.

Wildlife Interpretations:

The Subirrigated ecological site is important for enhancing biodiversity within an otherwise semi-arid environment. Although surface water is rarely present, the high water table allows growth of tall herbaceous and woody plants that provide habitat structure, food and cover for diverse wildlife species. The Historic Climax Plant Community (HCPC) was used by large herds of grazing ungulates, migrating shorebirds and waterfowl, flocks of sage grouse and many songbird species. Uncontrolled livestock grazing has greatly simplified this plant community in many areas. Livestock are attracted to the subirrigated site because of the availability of palatable, succulent forage when upland vegetation is dry. Invasive plants, including Canada thistle, Kentucky bluegrass, redtop and dandelion compete with native vegetation and degrade habitat for many wildlife species. Prescribed grazing strategies can maintain healthy wildlife habitat and promote vegetative productivity on this site. The proximity of uplands, subirrigated sites, riparian habitat and open water creates an exceptionally diverse habitat complex for a wide variety of wildlife.

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

The mesic environment and abundance of forbs support diverse insect and invertebrate populations ranging from grasshoppers and spiders to dragonflies and pollinating bees. Amphibians, such as Woodhouse’s toad, and reptiles, such as garter snakes, rely on this community for migration and over-wintering habitat. Amphibians can be considered a “keystone species” because of their value as indicators of environmental degradation. The HCPC supports a diverse bird population because of the mix of tall and medium grasses and sedges and abundant forbs. Northern harriers hunt over, and nest in, this community. Shorebirds such as the common snipe and upland sandpiper nest here. LeConte’s sparrow and the savanna sparrow are examples of songbird species using this plant community. Sage grouse broods find abundant insect foods here and adults select succulent forbs. The predominance of grasses and sedges in the HCPC favors grazers and mixed feeders like bison, elk and pronghorn. Thermal and escape cover are limited because of the low shrub coverage. Small mammals, such as the meadow vole, are common and abundant.

Plant Community 2: Medium Grasses and Sedges / Rushes/ Forbs:

Loss of tall grasses and sedges along with a change in the forb component represents a decrease in habitat structural diversity. Insect populations may still be abundant but are less diverse. Amphibian habitat is degraded by a reduction in surface litter and moisture. Breeding bird populations are less diverse as habitat structure is simplified. Common snipes will still use this community for nesting and feeding. Sage grouse broods continue to select this habitat for critical insect foods during their fast growth period follow hatching. Small mammal populations may shift away from dominance by voles to seedeaters like deer mice as ground cover decreases. Forage value for big game declines with the loss of a diverse mix of warm and cool season grasses.

Plant Community 3: Rushes / Medium and Short Grasses and Sedges / Shrubs / Invasive Forbs:

Insect populations decline in abundance and diversity with the loss of succulent forbs and increase in invasive weeds. Amphibians are negatively affected by a further loss of litter cover and an increasingly drier ground surface. Bird species diversity declines as habitat structural complexity is lost. Some species characteristic of drier habitats may increase. For ground-nesting birds, an increase in snowberry and rose cover may partially compensate for the sparser ground cover. Ungulate species will still find palatable forage (i.e., Kentucky bluegrass) but the forage diversity and length of green feed period have declined significantly.

Plant Community 4: Rushes / Non-Native Grasses/ Invasive Forbs:

Insects may be abundant during population highs but species diversity is considerably reduced. Amphibian and reptile habitat is degraded with the drying of the soil surface. Ground-nesting bird habitat is poor following loss of

ground cover although an increase in snowberry and rose, if it occurs, partially compensates for duck nesting. Ungulate species find succulent forage but for a shorter period of time compared to higher successional stages. Small mammal species composition further declines.

Hydrological functions

The runoff potential for this site is low. Runoff curve numbers generally range from 61 to 79. The soils associated with this ecological site are generally in Hydrologic Soil Group B. The infiltration rates for these soils will normally be moderate.

A drop in the water table elevation, such as a result of several years of drought conditions will result in a change in the plant community to more drought tolerant species (often non-native).

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): 3

BLM-Soil & Vegetation Inventory Method (SVIM) Data: 5

NRCS-Range Condition Record (ECS-2): 5

NRCS-Range/Soil Correlation Observations & Soil 232 notes: 10

Contributors

MJR, REL, RSN, POH
RSN

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
Contact for lead author	
Date	04/23/2005
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

2. **Presence of water flow patterns:** None.

3. **Number and height of erosional pedestals or terracettes:** None.

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 5%.

5. **Number of gullies and erosion associated with gullies:** None.

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

7. **Amount of litter movement (describe size and distance expected to travel):** Litter movement is very limited and would only occur in a rare flooding event.

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):** Soil surface structure is moderate or strong granular. Organic matter is 3-6%. The A-horizon is 6 to 16 inches thick. There may be a surface organic horizon up to 3 inches thick.

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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 bunchgrasses (and some rhizomatous grasses), plus grasslike plants, optimize infiltration and runoff. Bunchgrasses should be no more than 0.5-1.0 foot apart.

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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):** None.

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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: Warm and cool season native perennial bunchgrasses and grasslikes >> native shrubs > native forbs >> warm season rhizomatous grasses.

    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 (>5-6 years).

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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):** 3940 – 4420 #/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:** Kentucky bluegrass, Canada bluegrass, timothy, smooth brome, Baltic rush, redtop, thistles, snowberry, dandelion, Rocky Mountain iris, Russian olive.

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17. **Perennial plant reproductive capability:** This is not impaired in the reference state. Except in extended periods of drought, plants are able to reproduce sexually or vegetatively.