

Ecological site R058AC043MT Wet Meadow (WM) RRU 58A-C 11-14" p.z.

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General information

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

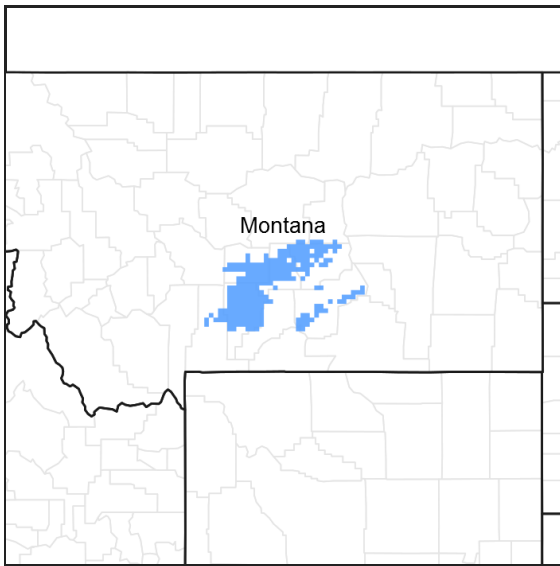


Figure 1. Mapped extent

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

Associated sites

R058AC044MT	Subirrigated (Sb) RRU 58A-C 11-14" p.z.
R058AC045MT	Overflow (Ov) RRU 58A-C 11-14" p.z.
R058AC617MT	Riparian Subirrigated (RSb) RRU 58A-C 11-14" p.z.

Similar sites

R058AC617MT	Riparian Subirrigated (RSb) RRU 58A-C 11-14" p.z. The Riparian Subirrigated site will be associated with a flowing water (lotic) system.
R058AC044MT	Subirrigated (Sb) RRU 58A-C 11-14" p.z. The water table of a Subirrigated site will be at a deeper depth, and the water is very seldom at or near the surface. If there is surface water, it will be present for only a short time. The plant community composition will tend to have more grasses and fewer sedges.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified

Physiographic features

This ecological site typically occurs on nearly level to slightly concave areas that have free water at or near the surface throughout the growing season. It can also occur around the margins of ponds. This site is too wet and poorly aerated (anaerobic) for most plants and cultivated crops, but not wet enough for true aquatics such as cattails. These sites are also called “lentic” (standing water) wetland/riparian areas.

Table 2. Representative physiographic features

Landforms	(1) Fen (2) Marsh (3) Bog
Flooding duration	Brief (2 to 7 days)
Flooding frequency	None to rare
Ponding duration	Brief (2 to 7 days) to long (7 to 30 days)
Ponding frequency	Occasional to frequent
Elevation	686–1,372 m
Slope	0–1%
Ponding depth	3–10 cm
Water table depth	0–61 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 80°s F for July and August. Summertime temperatures will typically reach in the 100°s F at some point during the summer, and can reach 90° F any month between May and September.

Conversely, winter temperatures can be cold, averaging in the mid teens to mid 20°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 30–40° 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 (32° 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 are deep soils that often have organic (Histic) surfaces or organic profiles. They normally will have free water within 2 feet of the surface keeping the upper part of the soil very moist or saturated for most of the growing season. These soils are non-saline and non-sodic, but may be calcareous or acidic.

Table 4. Representative soil features

Surface texture	(1) Mucky loam (2) Peaty clay
Drainage class	Somewhat poorly drained to poorly drained
Permeability class	Moderately slow to moderate
Soil depth	102–183 cm
Surface fragment cover <=3"	1–3%

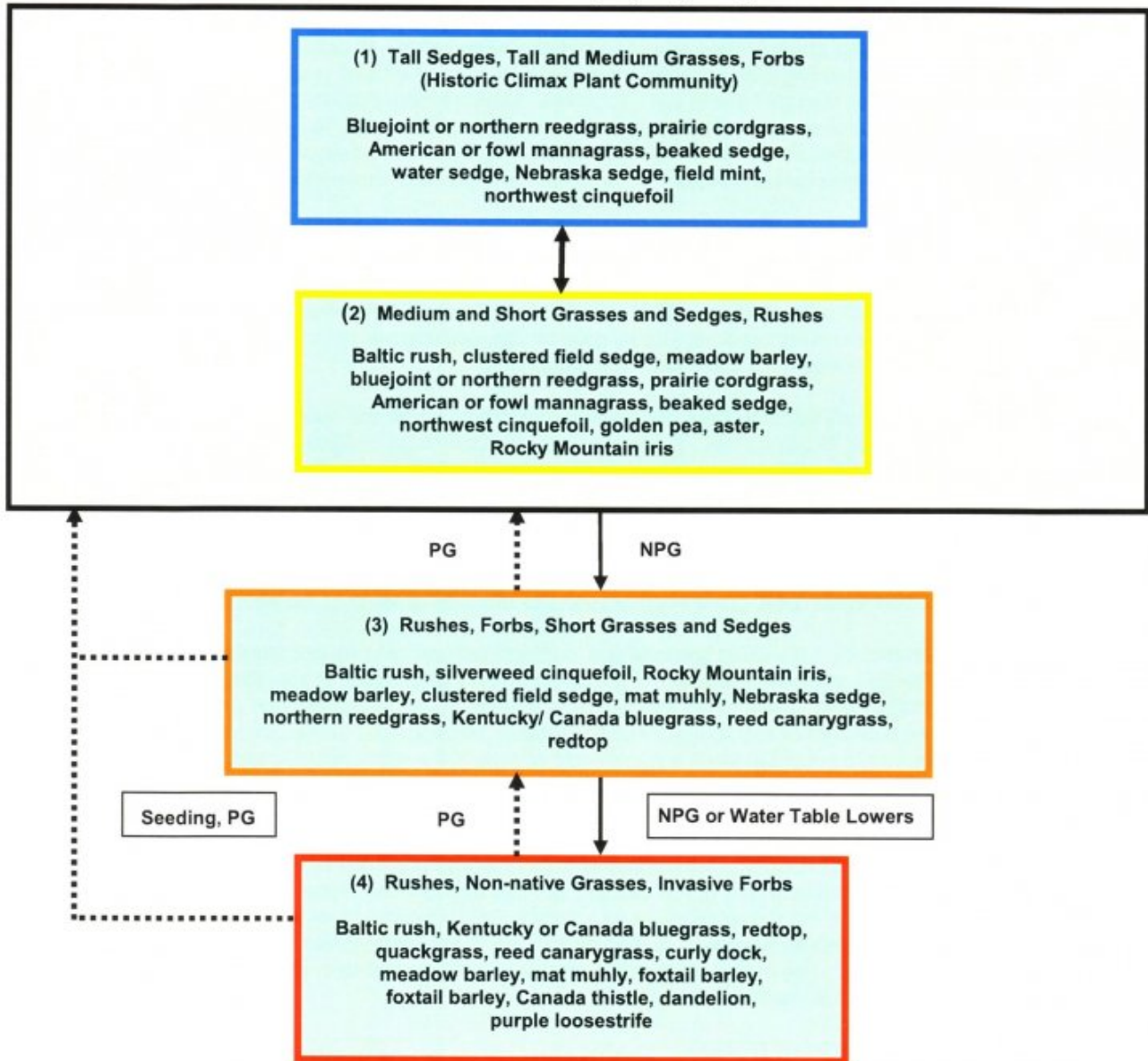
Ecological dynamics

The physical aspect of this site in Historical Climax (HCPC) is that of a meadow dominated by sedges, rushes, and grasses with a few forbs. Typically, few willows or other shrubs occur on this site.

Approximately 45% of the annual production is from sedges and other grass-like plants, 45% is from grasses, and 5% is from forbs. A trace amount up to 5% may be from shrubs. The following are descriptions of several plant communities that may occupy this site:

State and transition model

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 Sedges/ Tall and Medium Grasses/ Forbs
Community 1.1

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

This is the interpretive plant community and is considered to be the Historic Climax Plant Community (HCPC) for this site. This plant community contains a diversity of tall sedges (beaked, Nebraska, and water) and tall and medium height grasses (bluejoint or slimstem reedgrass, prairie cordgrass, American and fowl mannagrass, bearded/ slender wheatgrass). There are a variety of forbs that occur in smaller percentages, such as field mint and northwest cinquefoil. Sedges and rushes will become more dominant on wetter phases of this site. Once well established, they provide significant competition, often restricting the establishment of other species. This plant community is well adapted to the Northern Great Plains climatic conditions. The diversity in plant species allows for drought tolerance. Individual species can vary greatly in production depending on soil properties (depth to permanent water table) and growing conditions (timing and amount of precipitation, temperature). Plants on this site have strong, healthy root systems that allow production to respond with favorable moisture conditions. This plant community provides for soil stability and a functioning hydrologic cycle. 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 site, because of the permanent water table present, provides a very good soil-water-plant relationship. Maintaining good plant cover is necessary for successful management and production.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	6456	6613	6759
Shrub/Vine	359	364	375
Forb	359	364	375
Total	7174	7341	7509

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	0-1%
Grass/grasslike foliar cover	80-95%
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	1-3%
Grass/grasslike basal cover	15-25%
Forb basal cover	1-5%
Non-vascular plants	0%
Biological crusts	1-5%
Litter	50-80%
Surface fragments >0.25" and <=3"	1-3%

Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0-1%

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	–	0-1%	–	–
>0.6 <= 1.4	–	–	80-95%	–
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

State 2

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

Community 2.1

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

Slight degradation in the Historic Climax Plant Community, including a beginning response to non-prescribed grazing, will tend to change the HCPC/PPC to a community represented by an increase in plants such as Baltic rush, clustered field sedge, meadow barley, and mat muhly and forbs such as silverweed cinquefoil, golden pea, asters, and Rocky Mountain iris. The medium and tall sedges (beaked, Nebraska, and water) and grasses (bluejoint/northern reedgrass, prairie cordgrass, American and fowl mannagrass, bearded/slender wheatgrass) will still be present, sometimes still in relatively large amounts. Biomass production and litter become reduced on the site as the taller sedges and grasses disappear, increasing evaporation and reducing moisture intake and retention. Additional open space in this community can result in undesirable invader species. This plant community provides for moderate soil stability.

State 3

Plant Community 3: Rushes/ Forbs/ Short Grasses and Sedges

Community 3.1

Plant Community 3: Rushes/ Forbs/ Short Grasses and Sedges

With continued heavy disturbance, the site will become dominated by Baltic rush and some forbs, provided the hydrology of the site remains somewhat stable. Short grasses and sedges such as meadow barley, clustered field sedge, and mat muhly can also become common. Some climax species such as Nebraska sedge will still be relatively abundant. The taller grasses (bluejoint/northern reedgrass, bearded/slender wheatgrass, American/fowl mannagrass, and prairie cordgrass) will still be present, but in much smaller amounts. Palatable forbs will be mostly absent. Non-native grasses such as Kentucky or Canada bluegrass, fowl bluegrass, redtop, quackgrass, and reed canarygrass tend to become more common.

State 4

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

Community 4.1

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

If heavy disturbance continues and the water table lowers, making the site drier, the plant community can deteriorate to one primarily composed of non-native species such as Kentucky/Canada/fowl bluegrass, redtop, quackgrass, reed canarygrass and short grasses (meadow barley and mat muhly) with Baltic rush being the major remaining wetland species. There may be some other plants normally associated with drier conditions, such as pussytoes and cudweed sagewort present. There will be little of some of the more desirable species such as Nebraska sedge present. Foxtail barley, Canada thistle, and dandelion can be common invaders. Purple loosestrife is potentially a serious invader on this site. Plant communities 3 and 4 are significantly 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, thus eventually favoring species that are more adapted to drier conditions. These communities have lost many of the attributes of a healthy rangeland, including good infiltration, minimal erosion and runoff, nutrient cycling and energy flow. In many locations, this ecological site, because of its favorable moisture and topography, has been seeded to introduced species such as reed canarygrass or "Garrison" creeping foxtail for hay and/or pasture. Once these species have been established, they form a stable, long-lived stand that is extremely difficult and often expensive to restore to previous conditions.

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			3156–2628	
	American mannagrass	GLGR	<i>Glyceria grandis</i>	717–2253	–
	American sloughgrass	BESY	<i>Beckmannia syzigachne</i>	717–1502	–
	prairie cordgrass	SPPE	<i>Spartina pectinata</i>	359–1502	–
	bluejoint	CACA4	<i>Calamagrostis canadensis</i>	359–751	–
	slimstem reedgrass	CASTS5	<i>Calamagrostis stricta</i> ssp. <i>stricta</i>	359–751	–
	fowl mannagrass	GLST	<i>Glyceria striata</i>	359–751	–
	beardless wheatgrass	PSSPI	<i>Pseudoroegneria spicata</i> ssp. <i>inermis</i>	1–375	–
	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	1–375	–
2	Native grasses			72–751	
	Grass, perennial	2GP	<i>Grass, perennial</i>	72–375	–
	water whorlgrass	CAAQ3	<i>Catabrosa aquatica</i>	72–375	–
	meadow barley	HOB2	<i>Hordeum brachyantherum</i>	72–375	–
	mat muhly	MURI	<i>Muhlenbergia richardsonis</i>	72–375	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	72–375	–
3	Native annual grasses			1–3	
	foxtail barley	HOJU	<i>Hordeum jubatum</i>	1–3	–
4	Native sedges			3156–2535	
	beaked sedge	CARO6	<i>Carex rostrata</i>	1793–3004	–
	Nebraska sedge	CANE2	<i>Carex nebrascensis</i>	717–2253	–
	water sedge	CAAQA	<i>Carex aquatilis</i> var. <i>aquatilis</i>	1076–1877	–
	woollyfruit sedge	CALA11	<i>Carex lasiocarpa</i>	359–751	–
	woolly sedge	CAPE42	<i>Carex pellita</i>	359–751	–

	clustered field sedge	CAPR5	<i>Carex praegracilis</i>	72-375	-
	sedge	CAREX	<i>Carex</i>	1-375	-
	smallwing sedge	CAMI7	<i>Carex microptera</i>	72-375	-
	shortbeak sedge	CABR10	<i>Carex brevior</i>	72-375	-
5	Native rushes			72-841	
	rush	JUNCU	<i>Juncus</i>	1-375	-
	knotted rush	JUNO2	<i>Juncus nodosus</i>	1-375	-
	poverty rush	JUTE	<i>Juncus tenuis</i>	1-375	-
	Torrey's rush	JUTO	<i>Juncus torreyi</i>	1-375	-
Forb					
6	Native forbs			1-375	
	Forb, perennial	2FP	<i>Forb, perennial</i>	1-375	-
	silverweed cinquefoil	ARAN7	<i>Argentina anserina</i>	1-375	-
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	1-375	-
	aster	ASTER	<i>Aster</i>	1-375	-
	willowherb	EPILO	<i>Epilobium</i>	1-375	-
	bedstraw	GALIU	<i>Galium</i>	1-375	-
	Rocky Mountain iris	IRMI	<i>Iris missouriensis</i>	1-375	-
	wild mint	MEAR4	<i>Mentha arvensis</i>	1-375	-
	wild bergamot	MOFI	<i>Monarda fistulosa</i>	1-375	-
	slender cinquefoil	POGR9	<i>Potentilla gracilis</i>	1-375	-
	western dock	RUAQF	<i>Rumex aquaticus var. fenestratus</i>	1-375	-
	goldenbanner	THERM	<i>Thermopsis</i>	1-375	-
Shrub/Vine					
7	Native shrubs			1-375	
	Shrub, broadleaf	2SB	<i>Shrub, broadleaf</i>	1-375	-
	bog birch	BEPUG	<i>Betula pumila var. glandulifera</i>	1-375	-
	Woods' rose	ROWO	<i>Rosa woodsii</i>	1-375	-
	willow	SALIX	<i>Salix</i>	1-375	-
	silver buffaloberry	SHAR	<i>Shepherdia argentea</i>	1-375	-

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 and a grazing plan must be managed carefully on adjoining sites with less production to be sure livestock drift onto the Wet Meadow 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.

This site is extremely sensitive to trampling damage. Grazing this site when soils are wet can cause soil compaction, possibly also contributing to excessive hummocking. Grazing should occur after soils have dried, unless the amount of time the livestock spend on this site can be managed. Grazing a pasture early in the season can be accomplished when upland vegetation is green and high quality, and the meadow area is often colder.

Shorter grazing periods and allowing adequate re-growth after grazing are recommended for plant recovery and to reduce damage from excess hummocking or soil compaction.

Using this site as the primary water source can lead to foot problems for the livestock if they have to spend too much time standing in mud to get a drink. Several studies and practical experience have shown that providing off-site water will significantly reduce the amount of time spent at this site for drinking.

Vegetation is important for this site to maintain its function. A good vegetative cover will help maintain water infiltration, thus maintaining the ground water hydrology. Vegetation around the perimeter acts as a filter for sediment and nutrients that may be carried by surface runoff from the surrounding uplands. For sites that may be surrounding an open water area, good vegetative cover reduces erosion of the shorelines.

Whenever Plant Community 2 (medium 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 sedges and 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, it will be significantly 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, redtop, reed canarygrass, and Canada thistle are very difficult to remove by grazing alone. The potential for using mechanical treatment to improve site health can be limited, depending on the depth to the water table.

Wildlife Interpretations:

The Wet Meadow ecological site provides wildlife habitat benefits out of proportion to its minor occurrence on the overall landscape. Saturated soil conditions throughout much of the growing season support at least three times the vegetative production found on adjacent semi-arid uplands. The resulting structural diversity, cover value, food supply, and moist environment support a wide variety of wildlife species including animals restricted to the wet meadow environment and mobile species using a complex of habitats throughout the year. Historically, this site was used by large herds of migratory ungulates, waterfowl and other wetland-dependent species. Since livestock are attracted to this ecological site by abundant, green forage, the HCPC has often been altered by continuous grazing practices to more simplified, less productive plant communities which support fewer wildlife species. Kentucky bluegrass, redtop and Canada thistle are common invasive species which now dominate many wet meadow sites and reduce biodiversity.

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

The moist environment and abundance of forbs support a diverse assemblage of insects and other invertebrates, which feed a wide variety of wildlife species. Amphibians, a “keystone species” group because of their value as indicators of environmental disturbance, are represented by species such as the northern leopard frog and Woodhouse’s toad. Three species of garter snakes and, in the northeast corner of the state, the smooth green snake, are representative reptiles. The dense herbaceous cover attracts a number of breeding birds including the upland sandpiper, common snipe, savanna sparrow and LeConte’s sparrow. Sage grouse find succulent forbs and insects when surface water is not present. Northern harriers and short-eared owls hunt this site for meadow voles and other small mammals including the western jumping mouse and common shrew. The predominance of grasses and sedges favors grazers and mixed feeders like bison and elk.

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

Structural habitat diversity declines with the reduction/elimination of tall grasses and sedges. Insects and other invertebrates may still be abundant but less diverse. Amphibians preferring tall, dense vegetation, such as the northern leopard frog, are less common than in the HCPC/PPC. Nesting birds are more susceptible to predation as

the plant canopy opens up. Small mammals are also more vulnerable to predators and species diversity declines. Cover and forage value for big game animals declines with loss of tall, warm and cool season grasses and sedges.

Plant Community 3: Rushes/ Forbs/ Short Grasses & Sedges:

At this stage, wildlife habitat values have significantly declined. The loss of many desirable native forbs reduces insect species diversity considerably, although dandelion, Canada thistle and other forbs still host some species. Loss of ground cover and warmer surface temperatures inhibit amphibians. This community is still used for feeding by a number of bird species but nesting cover quality is very poor for all but a few. Killdeer, for example, will nest in this community. Small mammal species diversity declines significantly with the loss of plant and litter cover. The seed-eating deer mouse may increase. Big game habitat quality is poor because palatable, nutritious grass and sedge species have been removed and the green feed period shortened.

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

This community has very limited value for all but a few wildlife species. Insect and other invertebrate populations are much less diverse compared to later successional stages. Amphibians are represented by fewer individuals and species. Leopard frogs are probably absent. Disturbance-tolerant breeding birds are more numerous, including the killdeer and, possibly, the piping plover (especially if the site is somewhat saline). Sage grouse may continue to seek insects and succulent forbs (i.e. dandelion) here but cover value is low and predators may take a heavy toll. Small mammal populations are less diverse, shifting to more seed-eating species compared to a predominance of herbaceous voles present in higher seral stages. Big game cover value is almost non-existent and forage value is limited and shorter in duration.

Hydrological functions

The soils associated with this ecological site are generally in Hydrologic Soil Group C. The infiltration rates for these soils will generally be moderate. The runoff potential for this site is low. Runoff curve numbers generally range from 64 to 89.

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: $AUM/AC = [(2200-500)(0.25)]/915 \text{ lbs/month for one AU} = 0.46 \text{ AUM/AC}$
 $AC/AUM = (1.0 \text{ AU})/(0.46 \text{ AUM/AC}) = 2.2 \text{ AC/AUM}$

> 30% slopes: $AUM/AC = [(2200-800)(0.25)]/915 \text{ lbs/month for one AU} = 0.38 \text{ AUM/AC}$
 $AC/AUM = (1.0 \text{ AU})/(0.38 \text{ AUM/AC}) = 2.6 \text{ AC/AUM}$

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): 2

BLM Soil & Vegetation Inventory Method (SVIM) Data: 3

NRCS Range Condition Record (ECS-2): 10

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	04/11/2005
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 1% in the reference state.

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

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6. **Extent of wind scoured, blowouts and/or depositional areas:** None.
-
7. **Amount of litter movement (describe size and distance expected to travel):** None.
-
8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Stability values of 6 in all cases.
-
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** On mineral soils (with or without a 1 to 6 inch organic layer): The A-horizon structure is strong granular and is 6 to 24 inches thick. Organic matter is 4-8%. Seasonal water tables are typically at 1.0 to 2.0 feet. On organic soils: The organic layer ranges from 8 to >60 inches thick. Seasonal water tables are typically 0.0 to 1.0 ft.
-
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Deep-rooted native perennial grasslikes and grasses optimize infiltration and runoff.
-
11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None.
-
12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**
- Dominant: Native perennial grasslikes = native perennial bunch and rhizomatous grasses >> native shrubs = native forbs.
- Sub-dominant:
- Other:
- Additional:
-
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Plant mortality is low; decadence is minimal except in prolonged periods of drought (>5-6 years).
-
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):** 4400 – 6700 #/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/Canada/fowl bluegrasses, redtop, quackgrass, reed canarygrass (may have been seeded), pussytoes, cudweed sagewort, foxtail barley, Canada thistle, dandelion, purple loosestrife, Garrison creeping foxtail (may have been seeded)
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17. **Perennial plant reproductive capability:** Except in extended periods of drought, plants are able to reproduce sexually or vegetatively.
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