

Ecological site R058AE009MT
Wet Meadow (WM)
RRU 58A-E 10-14" p.z.

Accessed: 09/20/2026

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.

Associated sites

R058AY001MT	Loamy (Lo) 10-14 P.Z.
R058AE002MT	Clayey (Cy) RRU 58A-E 10-14" p.z.
R058AE004MT	Silty-Steep (SiStp) RRU 58A-E 10-14" p.z.
R058AE005MT	Clayey-Steep (CyStp) RRU 58A-E 10-14" p.z.
R058AE007MT	Overflow (Ov) RRU 58A-E 10-14" p.z.
R058AE008MT	Subirrigated (Sb) RRU 58A-E 10-14" p.z.

Similar sites

R058AE007MT	Overflow (Ov) RRU 58A-E 10-14" p.z. The Overflow site differs mainly by being associated with ephemeral streams and having no permanent water table.
R058AE008MT	Subirrigated (Sb) RRU 58A-E 10-14" p.z. The Subirrigated site differs mainly by having a permanent water table at about 3 feet of depth for most of the growing season (i.e., it is usually not wet to the surface, except occasionally for short periods of time during runoff or after a high intensity storm).
R058AE012MT	Saline Lowland (SL) RRU 58A-E 10-14" p.z. The Saline Lowland 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 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. Slopes are mainly 1 percent or less. 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.

Table 2. Representative physiographic features

Landforms	(1) Fen (2) Marsh (3) Bog
Flooding frequency	None
Ponding frequency	None
Elevation	580 – 1,070 m
Slope	0 %
Water table depth	0 – 20 cm
Aspect	Aspect is not a significant factor

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 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 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 (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)	150 days
Freeze-free period (average)	170 days
Precipitation total (average)	360 mm

Influencing water features

Free water is at or near the surface for most, or all of the growing season. The water source is mainly ground water, but there can also be run in from surrounding areas.

Soil features

These soils are hydric. They often have organic surfaces or organic (Histic) profiles. They are mainly deep or very deep. Textures vary and are not significant. The textures are mainly medium (loamy) to fine (clayey). Organic soils are mainly mucky textured. A water table is within 2 feet of the surface keeping the upper part of the soil very moist or saturated for all, or at least most of the growing season. These soils are non saline and non sodic, but can be calcareous or acid.

Table 4. Representative soil features

Surface texture	(1) Loam (2) Clay loam (3) Silt loam
Family particle size	(1) Loamy
Drainage class	Poorly drained
Permeability class	Moderate
Soil depth	100 – 150 cm

Available water capacity (0-101.6cm)	40.61 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 10 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified

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 highly resilient to disturbance as it has essentially no limitations for plant growth, except for growing season. Changes may occur to the Historic Climax Plant Community due to management actions and/or climatic conditions, such as a drop in water table level due to prolonged drought conditions. Under continued adverse impacts, a moderate decline in vegetative vigor and composition will occur. Under favorable vegetative management treatments, this site can readily return to the Historic Climax Plant Community (HCPC).

Continual adverse impacts to the site over a period of years, including a change in the hydrology, will result in a departure from the HCPC. A decrease of the tall and medium, palatable species such as prairie cordgrass, American and fowl mannagrass, tufted hairgrass, bluejoint and slimstem reedgrass, and beaked, Nebraska, woolly, and brevior sedges will occur. These plants will be replaced by a mixture of short sedges, rushes, and grasses, including Baltic rush, western wheatgrass, meadow barley, mat muhly, smallwing, and clustered field sedges as well as several species of non-palatable forbs. Baltic rush often becomes dominant on this site provided that the water table remains at or near its historic levels.

Continued deterioration results in an abundance of short grasses and short sedges, non-native grasses and forbs, and annuals. Plants that are not a part of the Historic Climax Plant Community that are most likely to invade are foxtail barley, Kentucky, Canada, and fowl bluegrass, smooth brome, redtop, Canada thistle, dandelion, leafy spurge, sulfur cinquefoil, curly dock, annuals, and other weedy species. These species often occur when the water table is deeper than its historic levels. Purple loosestrife is potentially a serious invader on this site.

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	Native grasses			2712-2914	
	prairie cordgrass	SPPE	<i>Spartina pectinata</i>	925-1821	–
	bluejoint	CACA4	<i>Calamagrostis canadensis</i>	62-1093	–

	American mannagrass	GLGR	<i>Glyceria grandis</i>	308-1093	–
	fowl mannagrass	GLST	<i>Glyceria striata</i>	308-729	–
	slimstem reedgrass	CASTS5	<i>Calamagrostis stricta ssp. stricta</i>	62-729	–
	American sloughgrass	BESY	<i>Beckmannia syzigachne</i>	308-729	–
	big bluestem	ANGE	<i>Andropogon gerardii</i>	0-364	–
	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	62-364	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	0-364	–
	switchgrass	PAVI2	<i>Panicum virgatum</i>	0-364	–
	beardless wheatgrass	PSSPI	<i>Pseudoroegneria spicata ssp. inermis</i>	62-364	–
2	Native grasses			62-364	
	Grass, perennial	2GP	<i>Grass, perennial</i>	62-364	–
	meadow barley	HOBR2	<i>Hordeum brachyantherum</i>	62-364	–
	mat muhly	MURI	<i>Muhlenbergia richardsonis</i>	62-364	–
3	Native grasses			0-1	
	foxtail barley	HOJU	<i>Hordeum jubatum</i>	0-1	–
4	Native sedges			1110-1311	
	beaked sedge	CARO6	<i>Carex rostrata</i>	616-1457	–
	Nebraska sedge	CANE2	<i>Carex nebrascensis</i>	308-1093	–
	clustered field sedge	CAPR5	<i>Carex praegracilis</i>	62-364	–
5	Native sedges			970-1149	
	woolly sedge	CAPE42	<i>Carex pellita</i>	308-729	–
	woollyfruit sedge	CALA11	<i>Carex lasiocarpa</i>	308-729	–
	smallwing sedge	CAMI7	<i>Carex microptera</i>	62-364	–
	sedge	CAREX	<i>Carex</i>	0-364	–
	shortbeak sedge	CABR10	<i>Carex brevior</i>	62-364	–
6	Native rushes			695-818	
	rush	JUNCU	<i>Juncus</i>	0-364	–
	knotted rush	JUNO2	<i>Juncus nodosus</i>	0-364	–
	poverty rush	JUTE	<i>Juncus tenuis</i>	0-364	–
	Torrey's rush	JUTO	<i>Juncus torreyi</i>	0-364	–
Forb					
7	Native forbs			62-729	
	Forb, perennial	2FP	<i>Forb, perennial</i>	62-364	–
	silverweed cinquefoil	ARAN7	<i>Argentina anserina</i>	62-364	–
	blue lettuce	LATAP	<i>Lactuca tatarica var. pulchella</i>	62-364	–
	wild mint	MEAR4	<i>Mentha arvensis</i>	62-364	–
	wild bergamot	MOFI	<i>Monarda fistulosa</i>	62-364	–
	slender cinquefoil	POGR9	<i>Potentilla gracilis</i>	62-364	–
	mountain blue-eyed grass	SISA4	<i>Sisyrinchium sarmentosum</i>	62-364	–
	alpine leafybract aster	SYFOF	<i>Symphotrichum foliaceum var. foliaceum</i>	62-364	–
Shrub/Vine					
8	Native shrubs			0-1	
	Shrub, broadleaf	2SB	<i>Shrub, broadleaf</i>	0-1	–
	rose	ROSA5	<i>Rosa</i>	0-1	–
	willow	SALIX	<i>Salix</i>	0-1	–
	silver buffaloberry	SHAR	<i>Shepherdia argentea</i>	0-1	–

Table 6. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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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 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. Grazing this site when the upper part of the soil is wet can cause compaction. Hummocking (frost heaving) is often a common feature of this site. Hummocking can be exacerbated if grazing impacts becomes excessive. 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 due to 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 and Medium Sedges and Grasses (HCPC): 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 Sedges, Grasses, Rushes/ Forbs: 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. 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 the loss of tall, warm and cool season grasses and sedges. Plant Community 3: Medium and Short Grasses, Sedges, & Rushes: At this stage, wildlife habitat values have significantly declined. The loss of 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 has been shortened. Plant Community 4: Short Grasses/ Rushes/ Non-native Grasses and 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 runoff potential for this site is high. Runoff curve numbers generally range from 79 to 88. The soils associated with this ecological site are generally in Hydrologic Soil Group D. 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 dryland species, particularly non-native species such as Kentucky bluegrass, redtop, and Canada thistle. Good hydrologic conditions exist on rangelands if plant cover (grass, sedge, and litter) is greater than 70%. Fair conditions exist when cover is between 30 and 70%, and poor conditions exist when cover is less than 30%. Sites in high similarity to HCPC (Plant Communities 1 and 2) generally have enough plant cover and litter to optimize infiltration, minimize runoff and erosion, and have a good hydrologic condition. The deep root systems of the potential vegetation help maintain or increase infiltration rates and reduce runoff. Sites in low similarity (Plant Community 4) are generally considered to be in poor hydrologic condition as the majority of plant cover is from shallow-rooted species such as Kentucky bluegrass. 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. Plant cover and litter helps retain soil moisture for use by the plants. Maintaining a healthy stand of perennial vegetation will optimize the amount of precipitation that is received. (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.

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: $AUM/AC = [(2200-500)(0.25)]/915 \text{ lbs/month for one AU} = 0.46$ AUM/AC $AC/AUM = (1.0 \text{ AU})/(0.46 AUM/AC) = 2.2$ $AC/AUM > 30\% \text{ slopes: } AUM/AC = [(2200-800)(0.25)]/915 \text{ lbs/month for one AU} = 0.38$ AUM/AC $AC/AUM = (1.0 \text{ AU})/(0.38 AUM/AC) = 2.6$ 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): 1 BLM-Soil & Vegetation Inventory Method (SVIM) Data: 3 NRCS-Range Condition Record (ECS-2): 10 NRCS-Range/Soil Correlation Observations & Soil 232 notes: 5

Contributors

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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
Contact for lead author	Tammy DeCock

Date	06/11/2014
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills should not be present.

2. **Presence of water flow patterns:** Barely observable.

3. **Number and height of erosional pedestals or terracettes:** Essentially non-existent.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**
Bare ground is < 5%. Bare ground will occur as small areas less than 2 inches in diameter.

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.

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

7. **Amount of litter movement (describe size and distance expected to travel):** Plant little to no litter movement. Plant litter remains in place and is not moved by erosional forces.

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 should typically be 6 with or without plant canopy.

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

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** High grass canopy and basal cover and small gaps between plants should reduce raindrop impact and slow overland flow, providing increased time for infiltration to occur. Healthy, deep rooted native grasses and grass likes enhance infiltration and reduce runoff.

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 should be evident.

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: sedges and rushes = Cool season, tall-stature, rhizomatous grasses

Sub-dominant: Warm season, tall-stature, rhizomatous grasses = Cool season, mid-stature, bunch grasses

Other: Minor Components: Cool season, mid-stature, bunch grasses; Cool season, mid-stature, rhizomatous grasses; warm season, mid-stature, bunch grasses; forbs; shrubs

Additional:

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

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

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 6250 to 6500 #/acre (13 to 14 inch precip. Zone) 5500 to 6000 #/ac (10 to 12 inch precip. Zone).

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:** Purple loosestrife, common tansy, oxeye daisy, Reed canarygrass.

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