

Ecological site R046XS107MT

Wet Meadow (WM)

RRU 46-S 15-19 PZ

Last updated: 7/19/2023
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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.

Associated sites

R046XS108MT	Subirrigated (Sb) RRU 46-S 15-19 PZ
R046XS109MT	Overflow (Ov) RRU 46-S 13-19 PZ

Similar sites

R046XS108MT	Subirrigated (Sb) RRU 46-S 15-19 PZ The water table of a Subirrigated site will be deeper, 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.
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Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) <i>Carex rostrata</i>

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 frequency	Rare
Ponding duration	Long (7 to 30 days)
Ponding frequency	Occasional to frequent
Slope	0 %
Ponding depth	0 – 10 cm
Water table depth	0 – 60 cm
Aspect	Aspect is not a significant factor

Climatic features

See Climatic Data Sheet for more details (Section II of the Field Office Technical Guide) or reference the following climatic web site:
<http://www.wrcc.sage.dri.edu/> .

Table 3 Representative climatic features

Frost-free period (characteristic range)	50-100 days
Freeze-free period (characteristic range)	110-120 days
Precipitation total (characteristic range)	360-460 mm
Frost-free period (actual range)	50-100 days
Freeze-free period (actual range)	100-130 days
Precipitation total (actual range)	330-460 mm
Frost-free period (average)	80 days
Freeze-free period (average)	110 days

Precipitation total (average)	410 mm
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- (1) JOLIET [USC00244506], Joliet, MT
- (2) COLUMBUS [USC00241938], Columbus, MT
- (3) BIG TIMBER [USC00240780], Big Timber, MT
- (4) MELVILLE 4 W [USC00245603], Big Timber, MT
- (5) MARTINSDALE 3 NNW [USC00245387], Martinsdale, MT
- (6) NYE 2 [USC00246190], Fishtail, MT

Influencing water features

No Stream Characteristics.

Non-Stream Characteristics (Cowardin System):

Soil features

These are deep soils that often have organic (Histic) surfaces or organic profiles. They are hydric. They typically 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	Poorly drained
Permeability class	Moderate to moderately slow
Soil reaction (1:1 water) (0-101.6cm)	6.1 – 7.8

Ecological dynamics

This site developed under Northern Rocky Mountain foothills 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 beaked, Nebraska, water, and woolly/woolfruit sedges, American and fowl mannagrasses, prairie cordgrass, bluejoint and slimstem reedgrasses, and tufted hairgrass 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, curly dock, annuals, and other weedy species. These species often occur when the water table is deeper (lower) than its historic levels. Purple loosestrife, leafy spurge, and sulfur cinquefoil are potentially serious invaders on this site.

State and transition model

Figure 7. 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 (%)
Shrub/Vine					
0	Shrubs			0-375	
	Shrub, broadleaf	2SB	<i>Shrub, broadleaf</i>	0-75	–
	bog birch	BEPUG	<i>Betula pumila</i> var. <i>glandulifera</i>	0-75	–
	Woods' rose	ROWO	<i>Rosa woodsii</i>	0-75	–
	willow	SALIX	<i>Salix</i>	0-75	–
	silver buffaloberry	SHAR	<i>Shepherdia argentea</i>	0-75	–
Forb					
0	Forbs			0-375	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0-375	–
	silverweed cinquefoil	ARAN7	<i>Argentina anserina</i>	68-375	–
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	0-375	–
	aster	ASTER	<i>Aster</i>	68-375	–
	willowherb	EPILO	<i>Epilobium</i>	68-375	–
	bedstraw	GALIU	<i>Galium</i>	68-375	–
	Rocky Mountain iris	IRMI	<i>Iris missouriensis</i>	0-375	–
	wild mint	MEAR4	<i>Mentha arvensis</i>	68-375	–
	wild bergamot	MOFI	<i>Monarda fistulosa</i>	68-375	–
	slender cinquefoil	POGR9	<i>Potentilla gracilis</i>	68-375	–
	western dock	RUAQF	<i>Rumex aquaticus</i> var. <i>fenestratus</i>	68-375	–
	prairie thermopsis	THRH	<i>Thermopsis rhombifolia</i>	0-375	–
Grass/Grasslike					
1	Grasses			2735-3379	
	bluejoint	CACA4	<i>Calamagrostis canadensis</i>	684-1502	–
	American mannagrass	GLGR	<i>Glyceria grandis</i>	342-1502	–
	prairie cordgrass	SPPE	<i>Spartina pectinata</i>	0-751	–
	fowl mannagrass	GLST	<i>Glyceria striata</i>	342-751	–
	slimstem reedgrass	CAST36	<i>Calamagrostis stricta</i>	342-751	–
	American sloughgrass	BESY	<i>Beckmannia syzigachne</i>	0-751	–
	water whorlgrass	CAAQ3	<i>Catabrosa aquatica</i>	0-375	–
	meadow barley	HOB2	<i>Hordeum brachyantherum</i>	0-375	–
	Grass, perennial	2GP	<i>Grass, perennial</i>	0-375	–

	bearded wheatgrass	ELCA11	<i>Elymus caninus</i>	171-375	–
	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	171-375	–
	mat muhly	MURI	<i>Muhlenbergia richardsonis</i>	0-375	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	0-375	–
	foxtail barley	HOJU	<i>Hordeum jubatum</i>	0-1	–
2	Sedges and Rushes			2735-3379	
	beaked sedge	CARO6	<i>Carex rostrata</i>	1709-3004	–
	Nebraska sedge	CANE2	<i>Carex nebrascensis</i>	684-2253	–
	water sedge	CAAQ	<i>Carex aquatilis</i>	1026-1877	–
	shortbeak sedge	CABR10	<i>Carex brevior</i>	68-375	–
	woollyfruit sedge	CALA11	<i>Carex lasiocarpa</i>	171-375	–
	smallwing sedge	CAMI7	<i>Carex microptera</i>	68-375	–
	woolly sedge	CAPE42	<i>Carex pellita</i>	171-375	–
	clustered field sedge	CAPR5	<i>Carex praeegracilis</i>	68-375	–
	sedge	CAREX	<i>Carex</i>	0-375	–
	rush	JUNCU	<i>Juncus</i>	0-375	–
	knotted rush	JUNO2	<i>Juncus nodosus</i>	0-375	–
	poverty rush	JUTE	<i>Juncus tenuis</i>	0-375	–
	Torrey's rush	JUTO	<i>Juncus torreyi</i>	0-375	–

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 can be a preferred site for grazing by livestock, and animals can tend to congregate in these areas. In order to maintain the productivity of the Wet Meadow site, grazing on adjoining sites with less production must be managed carefully to be sure utilization on this site is not excessive. Management objectives should include maintenance or improvement of the plant community. 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. 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. Livestock can incur foot problems if they have to spend too much time using a wet site. A mineral supplement containing Iodine has been effective in treating this condition. In addition, providing off-site drinking water will significantly reduce the amount of time spent at this site. Using shorter grazing periods and providing for adequate re-growth after grazing are recommended for plant maintenance, health, and recovery. Continual non prescribed grazing of this site can be detrimental and will alter the plant composition and production over time. The result will be plant communities that resemble 3 and 4, depending on how long this type of grazing is used as well as other circumstances such as weather conditions and fire frequency. Whenever Plant Community 2 (medium and short sedges, grasses, rush) occurs, grazing management strategies that will prevent further degradation need to be implemented. This community is still stable, productive, and healthy provided it receives proper management. It 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 towards the potential / historic climax community, unless the water table has been lowered, in which case a strategy for restoring the hydrology is also needed. Plant community 3 is the result of long-term, heavy, continuous grazing, annual, early season grazing, and/or a significant change in the hydrology of the site (i.e., lowering of the water

table). Repeated heavy early spring grazing, especially during stem elongation (generally mid May through mid June), can also have detrimental affects on the taller, key forage species. Repeated spring grazing depletes stored carbohydrates, resulting in weakening and eventual death of the cool season tall and medium grasses. This plant community can occur throughout the pasture, on spot grazed areas, and around water sources where season-long grazing patterns occur. It becomes critical at this point to implement a grazing strategy that will restore the stability and health of the site and prevent further degradation. Additional growing season rest, often combined with other practices (e.g., seeding), is usually necessary for re-establishment of the desired native species and to restore the stability and health of the site. The potential for using seeding or mechanical treatment practices to improve site health can be limited, depending on the depth to the water table. Plant Community 4 has a high percentage of aggressive, less-desirable species. Once established, plants such as Kentucky bluegrass, reedtop, reed canarygrass, and Canada thistle are very difficult to remove. Grazing management alone is usually not enough to restore the site to one that resembles the HCPC. Re-seeding typically becomes necessary for re-establishment of the desired species, especially with Community 4 having a sizable component of non native perennial grasses. Prescribed grazing needs to be used after seeding to ensure the success and longevity of the practice. Calculating Safe Stocking Rates: Proper stocking rates should be incorporated into a grazing management strategy that protects the resource, maintains or improves rangeland health, and is consistent with management objectives. Safe stocking rates will be based on useable forage production, and should consider ecological condition and trend of the site, and past grazing use history. Calculations used to determine a safe stocking rate are based on the amount of useable forage available, taking into account the harvest efficiency of the animal and the grazing strategy to be implemented. Average annual production must be measured or estimated to properly assess useable forage production and stocking rates. Stocking rates are calculated from average forage production values using a 25% Harvest Efficiency factor for preferred and desirable plants, and 10% Harvest Efficiency for less desirable species. AUM calculations are based on 915 pounds (air-dry) per animal unit month (AUM) for a 1,000-pound cow with calf up to 4 months. No adjustments have been made for site grazability factors, such as steep slopes, site inaccessibility, or distance to drinking water. 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 $AC/AUM = (1.0 \text{ AU})/(0.38 \text{ AU} \text{ M/AC}) = 2.6$ 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).

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, reedtop, and Canada thistle. 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. Plant cover and litter helps retain soil moisture for use by the plants. Maintaining a healthy stand of perennial native vegetation with deep root systems will optimize the amount of precipitation that is received, help maintain or increase infiltration rates and reduce runoff. For arid and semi-arid rangelands, good hydrologic conditions exist if 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 the HCPC (Plant Communities 1 & 2) generally have enough plant cover and litter to optimize infiltration, minimize runoff and erosion, and have a good hydrologic condition. 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. The deep root systems of the potential vegetation help maintain or increase infiltration rates and reduce runoff. Sites in low similarity (Plant Communities 3 and 4) are generally considered to be in less than good hydrologic condition as the majority of plant cover is from shallow rooted species such as Kentucky bluegrass and reedtop. (Reference: Engineering Field Manual, Chapter 2 and Montana Supplement 4).

Recreational uses

This site provides some recreational opportunities for bird watching. The forbs have flowers that appeal to photographers. This site provides valuable open space and visual aesthetics. Caution should be used because of the wet soils and potential for standing or open water on this site.

Wood products

None.

Contributors

Approval

Kirt Walstad, 7/19/2023

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)	G. Petersen
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Date	03/01/2020
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills are not present in the reference condition.

2. **Presence of water flow patterns:** Water flow patterns are not present in the reference condition.

3. **Number and height of erosional pedestals or terracettes:** Pedestals are not evident in the reference condition.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**
Bare ground is 0%.

5. **Number of gullies and erosion associated with gullies:** Gullies are not present in the reference condition.

6. Extent of wind scoured, blowouts and/or depositional areas: Wind scoured, or depositional areas are not evident in the reference condition.

7. Amount of litter movement (describe size and distance expected to travel): Litter movement is not evident in the reference condition.

8. Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values): The average soil stability rating is 6 under plant canopies and plant interspaces due to high rootmat coverage. The A horizon is 10-15 inches thick.

9. Soil surface structure and SOM content (include type of structure and A-horizon color and thickness): Soil Structure at the surface will be challenging to determine as site is wet however will trend moderate, fine granular to weak fine subangular blocky. A Horizon will be 10-15 inches thick and will be very dark with color, when wet, typically ranging in Value of 3 or less and Chroma of 2 or less. This site may express an organic layer of up to 8" above the A horizon. Evidence of redoximorphic features may be present in A horizon which may affect color. Local geology may affect color, it is important to reference the Official Series Description (OSD) for characteristic range. <https://soilseries.sc.egov.usda.gov/osdname.aspx>

10. Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff: Infiltration of the Wet Meadow ecological site is slow to rapid. The site is poorly drained. An even distribution of mid stature grasses (40-50%), cool season sedges/rushes (30-35%) along with rhizomatous grass (15-20%), forbs (5-10%), and shrubs (3-5%)

11. Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site): A compaction layer is not present in the reference condition. Soil profile may contain an abrupt transition to an Argillic horizon which can be misinterpreted as compaction, however, the soil structure will be fine to medium subangular blocky, where a compaction layer will be platy or structureless (massive).

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: Mid-statured, cool season, perennial bunchgrasses (bluejoint, mannagrass, tufted hairgrass) = large sedges (Nebraska sedge, beaked sedge, water sedge)

Sub-dominant: rushes > rhizomatous grasses > forbs ? shrubs

Other:

Additional:

13. Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence): Mortality in herbaceous species is not evident. Species with bunch growth forms may have some natural mortality in centers is 3% or less.

14. **Average percent litter cover (%) and depth (in):** Total litter cover ranges from 50-80%. Most litter is irregularly distributed on the soil surface and may exceed 1" thick in places

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**
Average annual production is 6200. Low: 5500 High 6500. Production varies based on effective precipitation and natural variability of soil properties for this ecological site.

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: Potential invasive (including noxious) species (native and non-native). Invasive species on this ecological site include (but not limited to) sulphur cinquefoil, houndstounge, whitetop, Canada thistle, annual brome spp, yellow toadflax, leafy spurge, meadow foxtail, smooth brome, Kentucky bluegrass, Canada bluegrass, Timothy, redtop Native species such as rocky mountain iris, larkspur, lupine, etc. when their populations are significant enough to affect ecological function, indicate site condition departure.

17. **Perennial plant reproductive capability:** In the reference condition, all plants are vigorous enough for reproduction either by seed or rhizomes in order to balance natural mortality with species recruitment.
