USDA Natural Resources Conservation Service

Ecological site R046XC504MT
Overflow (Ov) RRU 46-C 13-19 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.

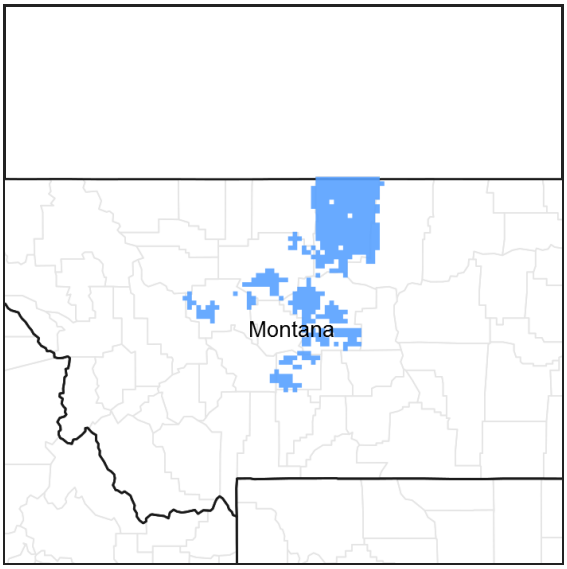

Figure 1. Mapped extent

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

R046XC505MT	**Sandy (Sy) RRU 46-C 13-19 PZ**
R046XC508MT	**Silty (Si) RRU 46-C 13-19 PZ**
R046XC512MT	**Subirrigated (Sb) RRU 46-C 13-19 PZ**
R046XC516MT	**Silty Steep (SiStp) RRU 46-C 13-19 PZ**
R046XC518MT	**Wet Meadow (WM) RRU 46-C 15-19 PZ**

Similar sites

R046XC520MT	**Riparian Subirrigated (RSb) RRU 46-C 13-19 PZ** The Riparian Subirrigated site differs mainly by being adjacent to perennial or intermittent streams and being frequently flooded.
R046XC518MT	**Wet Meadow (WM) RRU 46-C 15-19 PZ** The Wet Meadow site differs mainly by being wet to at or near the surface for most of the growing season.

Table 1. Dominant plant species

Tree	Not specified

Shrub	Not specified
Herbaceous	(1) *Leymus cinereus* (2) *Achnatherum*

Physiographic features

This ecological site occurs in swales and narrow drainages where it receives more than normal moisture because of run-in from adjacent areas. It is associated mainly with ephemeral streams (those that flow only in direct response to a precipitation event or snow melt, and the water table is lower than the channel bottom).

Table 2. Representative physiographic features

Landforms	(1) Swale (2) Drainageway
Flooding frequency	None to rare
Ponding frequency	None
Slope	0–4%
Water table depth	107–152 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)	67-87 days
Freeze-free period (characteristic range)	111-124 days
Precipitation total (characteristic range)	381-432 mm
Frost-free period (actual range)	53-88 days
Freeze-free period (actual range)	104-126 days
Precipitation total (actual range)	356-483 mm
Frost-free period (average)	76 days
Freeze-free period (average)	116 days
Precipitation total (average)	432 mm

Climate stations used

- (1) RAYNESFORD 2 NNW [USC00246902], Raynesford, MT
- (2) STANFORD [USC00247864], Stanford, MT
- (3) LEWISTOWN MUNI AP [USW00024036], Lewistown, MT
- (4) ZORTMAN [USC00249900], Zortman, MT
- (5) DENTON [USC00242347], Denton, MT
- (6) HOBSON [USC00244193], Hobson, MT

Influencing water features

Stream Type: ephemeral, flowing only in direct response to snow melt or precipitation events. Ephemeral streams typically flow less than 30 consecutive days at a time. The bottom of the channel is above the water table at all times. The Rosgen system of classification does not apply to ephemeral systems.

Non-Stream Characteristics: N/A

Soil features

These soils are non-hydric. The soils associated with this ecological site are moderately deep to very deep. Textures will vary since these are alluvial soils, having been deposited by flowing water. Surfaces are often dark due to the supplemental moisture they receive. Available water holding capacity is high. Permeability varies because of the various textures and materials and the depositional patterns.

Table 4. Representative soil features

Surface texture	(1) Loam (2) Sandy loam (3) Clay loam
Drainage class	Well drained
Permeability class	Moderate
Soil depth	51–183 cm
Available water capacity (0-101.6cm)	12.7–15.24 cm
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Soil reaction (1:1 water) (0-101.6cm)	6.6–8.4

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 given 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 (HCPC) due to management actions and/or climatic conditions, such as prolonged drought. Under continued adverse impacts, a moderate decline in vegetative vigor and composition will occur. Under favorable vegetative management treatments the site can readily return to the Historic Climax Plant Community.

Continual adverse impacts to the site over a period of years results in a departure from the HCPC, with a decrease of the taller, more palatable species such as basin wildrye, the tall needlegrass species, and bearded/slender wheatgrass. Nebraska or other sedge species may be common in some locations, depending on the site's hydrology. Prairie sandreed can be common on sites that are predominately sandy textured. These plants will be replaced by a mixture of medium (western wheatgrass, needleandthread) and short grasses (prairie junegrass, Sandberg bluegrass) as well as several species of non-palatable forbs. Baltic rush, if present will increase in abundance. Several less desirable forbs, including cudweed sagewort, American licorice, Rocky Mountain iris, goldenrods, and western yarrow will be more abundant. Shrubs such as Wood's rose and snowberry also increase.

Continued deterioration results in an abundance of short grasses, weedy forbs, shrubs, and annuals. Plants that are not a part of the Historic Climax Plant Community that are most likely to invade include quackgrass, Kentucky and Canada bluegrass, timothy, foxtail barley, annual bromes, houndstongue, curlycup gumweed, cocklebur, thistles, dandelion, annual forbs, and other weedy species. Canada thistle, spotted knapweed, sulphur cinquefoil, and dalmation toadflax are potential noxious weed invaders.

Long-term non-use (>3 years) combined with the absence of fire will result in excessive litter and decadent plants, plus an increase in the amount of shrubs.

State and transition model

Ecosystem states

1. Tall and Medium Grasses, Forbs, Shrubs

2. Medium and Short Grasses, Increaser Forbs, Shrubs

3. Shrubs, Medium and Short Grasses, Non-Native Grasses, Forbs

4. Shrubs, Non-native Short Grasses, Invasive & Weedy Forbs

State 1 submodel, plant communities

1.1. Tall and Medium Grasses, Forbs, Shrubs

State 2 submodel, plant communities

2.2. Medium and Short Grasses, Increaser Forbs, Shrubs

State 3 submodel, plant communities

3.3. Shrubs, Medium and Short Grasses, Non-Native Grasses, Forbs

State 4 submodel, plant communities

4.4. Shrubs, Non-native Short Grasses, Invasive & Weedy Forbs

State 1
Tall and Medium Grasses, Forbs, Shrubs

Community 1.1
Tall and Medium Grasses, Forbs, Shrubs

This is the interpretive plant community and is considered to be the Historic Climax Plant Community (HCPC)for this site. This plant community contains a diversity of tall and medium height, cool season grasses (basin wildrye, green needlegrass, and slender and bearded wheatgrass). Warm season grasses (prairie cordgrass) may also occasionally be present. Prairie sandreed tends to occur where the soil surfaces are sandy. Sedges (i.e., Nebraska) and rushes (i.e., Baltic) will occur in more favorable sites. There are numerous forbs (geranium, American vetch) that occur in smaller percentages. Shrubs such as western or common snowberry, Wood's rose and occasionally chokecherry, golden currant, Douglas hawthorne, or American plum can be common. This plant community is well adapted to the Northern Rocky Mountain foothills climatic conditions. 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, and temperature). This plant community is well suited to managed livestock grazing and provides diverse habitat for many wildlife species. The location of this site in the landscape plus the influence of extra water in the early part of the growing season provides a very favorable soil-water-plant relationship. This plant community provides for soil stability and a functioning hydrologic cycle. Abundant plant litter is available for soil building and moisture retention. Plant litter is properly distributed with very little movement off-site and natural plant mortality is very low. Maintaining good plant cover is necessary for successful management and production and to avoid excessive erosion during runoff events.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1939	2464	2976
Shrub/Vine	594	794	992
Forb	151	263	398
Total	**2684**	**3521**	**4366**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	14-25%
Grass/grasslike foliar cover	75-85%
Forb foliar cover	1-5%
Non-vascular plants	0%
Biological crusts	0%
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	8-10%
Grass/grasslike basal cover	26-30%
Forb basal cover	2-4%
Non-vascular plants	0%

Biological crusts	0%
Litter	55-65%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0-1%
Bedrock	0%
Water	0%
Bare ground	0-1%

Figure 9. Plant community growth curve (percent production by month). MT0815, Cool & warm season grasses on overflow areas. Includes all overflow sites dominated by cool season grass with warm season grasses also present..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	20	40	20	10	5	0	0	0

State 2
Medium and Short Grasses, Increaser Forbs, Shrubs

Community 2.1
Medium and Short Grasses, Increaser Forbs, Shrubs

Early stages of degradation to the Historic Climax Plant Community, including a beginning response to non-prescribed grazing, will tend to change it to a community represented by an increase in western wheatgrass and western snowberry and other grasses such as needleandthread, Sandberg bluegrass, prairie junegrass, and plains reedgrass. The medium and tall grasses such as basin wildrye, tall needlegrass, bearded/slender wheatgrass will still be present, sometimes in relatively large amounts. Nebraska sedge, if present in Community 1, will tend to decrease. Baltic rush if present initially, will tend to become more abundant. There may be an increase in some non-palatable increaser forbs such as American licorice, horsemint, goldenrods, and cudweed sagewort. Some non-native grasses such as Kentucky or Canada bluegrass, smooth brome, or quackgrass may become present Biomass production and litter become reduced on the site with as the taller grasses become replaced by shorter ones, especially the non-native grasses. Evapotranspiration tends to increase, moisture retention is reduced, and soil surface temperatures increase. Some natural ecological processes will be altered. This plant community provide for moderate soil stability, increasing the potential for erosion during runoff events. Increased amounts of bare ground can result in undesirable species invading. Common invaders can include Canada thistle, spotted knapweed, dalmation toadflax, sulphur cinquefoil, and leafy spurge. This plant community will readily respond to improved grazing management, but a significant amount of time can be necessary to move it toward a higher successional stage and a more productive plant community similar to community 1.

State 3
Shrubs, Medium and Short Grasses, Non-Native Grasses, Forbs

Community 3.1
Shrubs, Medium and Short Grasses, Non-Native Grasses, Forbs

With continued heavy disturbance, the site will become dominated by western or common snowberry or rose. Western wheatgrass, needleandthread, Sandberg bluegrass and prairie junegrass become more prevalent. Baltic rush will continue to be more abundant. The taller grasses (basin wildrye, tall needlegrass, bearded, and slender wheatgrass) will still be present, but in much smaller amounts. Non-native grasses (Kentucky and Canada bluegrass) can be common. Palatable forbs will be mostly absent, having been replaced by species such as cudweed sagewort, American licorice, goldenrods, Rocky Mountain iris, and western yarrow. Weedy species such as houndstongue, cocklebur, dandelion and Canada thistle become more abundant. This plant community is the result of long-term, heavy, continuous grazing and/or annual, early spring seasonal grazing. 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. This community will respond positively to improved grazing management, but significant economic inputs and a signinicant amount of time are usually required to move this plant community toward a higher successional stage and a more productive plant community.

State 4
Shrubs, Non-native Short Grasses, Invasive & Weedy Forbs

Community 4.1
Shrubs, Non-native Short Grasses, Invasive & Weedy Forbs

Further deterioration of community 3 results in a plant community dominated by undesirable plants such as shrubs (snowberry, rose) and non-native short and mid grasses (Kentucky/Canada bluegrass, timothy). Native short grasses such as Sandberg bluegrass will be abundant, as will Baltic rush. Western wheatgrass and needleandthread may still be present. The taller grasses will occur only rarely, often underneath the shrub canopy. Weedy forbs including houndstongue, cocklebur, iris, and goldenrods will be abundant. Invasive forbs (e.g., thistles, leafy spurge, dandelion) are likely to be common. Plant communities 3 and 4 produce less usable forage for wildlife and livestock than the other two described. The continuation of the downward trend and degradation of this site has resulted in higher soil surface temperatures, reduced water infiltration, and higher evapotranspiration. This has resulted in plant species that are more adapted to drier conditions, such as Kentucky or Canada bluegrass. Most of the attributes of a healthy rangeland, including good infiltration, nutrient cycling and energy flow, have been lost. It is critical at this point to implement a grazing strategy that will restore the stability, health, and hydrology of the site. Communities 3 and 4 can respond positively to improved grazing management. However,grazing management alone typically will not be enough to restore the site to one that resembles the HCPC/PPC because of the higher percentage of aggressive, less desirable species that can be present. Additional rest, usually for a number of years, can sometimes help with re-establishment of the desired species, depending on the species composition at the time. Kentucky and Canada bluegrass can be very difficult to eliminate once established. It generally takes additional inputs, such as seeding and/or brush management, to move it towards communities similar in production and composition to the HCPC/PPC. Because of the potential hazard of accelerated water erosion when the soil surface is not protected by plant cover during an overflow event, the use of seeding will depend on the specific site location and setting.

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Shrub/Vine					
0	**Shrubs and Half-shrubs**			594–992	
	Shrub, broadleaf	2SB	*Shrub, broadleaf*	0–196	–
	silver sagebrush	ARCAV2	*Artemisia cana ssp. viscidula*	0–196	–
	prairie sagewort	ARFR4	*Artemisia frigida*	0–196	–
	basin big sagebrush	ARTRT	*Artemisia tridentata ssp. tridentata*	0–196	–
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	0–196	–
	shrubby cinquefoil	DAFRF	*Dasiphora fruticosa ssp. floribunda*	0–196	–
	American plum	PRAM	*Prunus americana*	0–196	–
	chokecherry	PRVI	*Prunus virginiana*	0–196	–
	currant	RIBES	*Ribes*	0–196	–
	Woods' rose	ROWO	*Rosa woodsii*	0–196	–
	silver buffaloberry	SHAR	*Shepherdia argentea*	0–196	–
	common snowberry	SYAL	*Symphoricarpos albus*	0–196	–
	western snowberry	SYOC	*Symphoricarpos occidentalis*	0–196	–
Grass/Grasslike					

0	**Grasses, Sedges, Rushes**			1939–2976	
	basin wildrye	LECI4	*Leymus cinereus*	594–1586	–
	western wheatgrass	PASM	*Pascopyrum smithii*	151–594	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	0–398	–
	green needlegrass	NAVI4	*Nassella viridula*	74–248	–
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	74–248	–
	Columbia needlegrass	ACNE9	*Achnatherum nelsonii*	74–248	–
	western needlegrass	ACOC3	*Achnatherum occidentale*	74–248	–
	slender wheatgrass	ELTRT	*Elymus trachycaulus ssp. trachycaulus*	76–200	–
	slender wheatgrass	ELTRS	*Elymus trachycaulus ssp. subsecundus*	76–200	–
	bluebunch wheatgrass	PSSPS	*Pseudoroegneria spicata ssp. spicata*	76–200	–
	little bluestem	SCSC	*Schizachyrium scoparium*	76–200	–
	mountain brome	BRMA4	*Bromus marginatus*	0–196	–
	Nebraska sedge	CANE2	*Carex nebrascensis*	0–196	–
	clustered field sedge	CAPR5	*Carex praegracilis*	0–149	–
	Grass-like (not a true grass)	2GL	*Grass-like (not a true grass)*	0–149	–
	Grass, perennial	2GP	*Grass, perennial*	0–149	–
	plains reedgrass	CAMO	*Calamagrostis montanensis*	0–149	–
	Sandberg bluegrass	POSE	*Poa secunda*	0–149	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–149	–
Forb					
0	**Forbs**			151–398	
	sticky purple geranium	GEVI2	*Geranium viscosissimum*	1–196	–
	American licorice	GLLE3	*Glycyrrhiza lepidota*	0–196	–
	Rocky Mountain iris	IRMI	*Iris missouriensis*	0–196	–
	wild bergamot	MOFI	*Monarda fistulosa*	0–196	–
	cinquefoil	POTEN	*Potentilla*	0–196	–
	goldenrod	SOLID	*Solidago*	0–196	–
	prairie thermopsis	THRH	*Thermopsis rhombifolia*	0–196	–
	American vetch	VIAM	*Vicia americana*	0–196	–
	Forb, perennial	2FP	*Forb, perennial*	0–196	–
	western yarrow	ACMIO	*Achillea millefolium var. occidentalis*	0–196	–
	silverweed cinquefoil	ARAN7	*Argentina anserina*	0–196	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	0–196	–
	aster	ASTER	*Aster*	0–196	–
	larkspur	DELPH	*Delphinium*	0–1	–
	deathcamas	ZIGAD	*Zigadenus*	0–1	–
	lupine	LUPIN	*Lupinus*	0–1	–

Animal community

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 the Overflow 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. 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 numbers 3 and 4, depending on how long this grazing management is used as well as other circumstances such as weather conditions and fire frequency.

Whenever Plant Community 2 (medium and short grasses) 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 back towards the potential / historic climax community.

Plant community 3 is the result of long-term, heavy, continuous grazing and/or annual, early spring seasonal grazing. 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 is critical at this point to implement a grazing strategy that will restore the stability and health of the site. 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.

Plant Community 4 has a high percentage of aggressive, less-desirable species. It has lost most of the attributes of a healthy rangeland. Grazing management alone is seldom able to restore the site to one that resembles the HCPC/PPC once this plant community has become established. Seeding, brush management, and/or mechanical treatment on this site should be done in such a way to minimize the potential for water erosion since this site occurs in a swale/waterway.

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.

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 AU! 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).

Wildlife Interpretations: This ecological site is a “hotspot” of biodiversity as a result of extra moisture availability in ephemeral drainageways. The run-in moisture provides more wildlife habitat complexity because of greater plant species and structural diversity compared to surrounding semi-arid uplands. The linear, meandering drainage pattern common to this site connects a wide variety of upland types and provides secure travel corridors for big game and many other wildlife species as they move between required seasonal habitats. Moisture availability and resulting habitat structural diversity provide for the food, cover and nesting needs of resident and transitory neotropical migratory birds. Invasive plant species are common on this site under non-use as well as season-long livestock and big game grazing. Canada thistle, leafy spurge, houndstongue and burdock are often found here. Prescribed grazing strategies can keep native vegetation more competitive with these invasive weeds. Wildlife habitat diversity is often degraded on this site under season-long grazing strategies because livestock are attracted to the green forage, particularly during the dry season. Seeps and springs common in association with this site provide drinking water for many wildlife species as well as habitat for less common invertebrates, reptiles and amphibians, birds and small mammals.

Hydrological functions

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

Good hydrologic conditions exist on rangelands if plant cover (grass, forb, and shrub, 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 Communities 3 and 4) are generally considered to be in poor hydrologic condition and are susceptible to excessive erosion from stream overflow.

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

Because of the biodiversity, varied structure and other features noted in the wildlife section, this site should provide some outstanding opportunities for recreation, such as bird watching. This site provides opportunities for hiking, horseback riding, big game and upland bird hunting. The forbs have flowers that appeal to photographers. This site provides valuable open space and visual aesthetics. Caution should be used during runoff and other wet weather periods.

Wood products

None

Contributors

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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.

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Date	03/01/2020
Approved by	Kirt Walstad
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.

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

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

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is low (0-1 percent). It consists of very small, randomly scattered patches.

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

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

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

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** The average soil stability rating is 5-6 under plant canopies and plant interspaces. The A horizon is 6-8 inches thick.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil Structure at the surface is typically strong to medium fine granular. A Horizon should be 6-8 inches thick with color, when wet, typically ranging in Value of 3 or less and Chroma of 3 or less. Local geology may affect color in which it is important to reference the Official Series Description (OSD) for characteristic range.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Infiltration of the Overflow ecological site is moderate and is well drained. An even distribution of mid to tall statured grasses, 70-75% of site production, cool season rhizomatous grasses 5-10% of site production along with a mix of shortgrass (0-5%), forbs (5-7%) and shrubs (15-20%).

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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):** 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).

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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: Mid-Tall statured, cool season, perennial bunchgrasses (Primarily Basin wildrye Columbia needlegrass, bluebunch wheatgrass)

    Sub-dominant: Shrubs > Rhizomatous Grasses > Forbs > Shortgrasses

    Other:

    Additional:

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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.

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14. **Average percent litter cover (%) and depth (in):** Total litter cover ranges from 60 to 65%. Most litter is irregularly distributed on the soil surface and is not at a measurable depth.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-**

production): Average annual production is 3100. Low: 2400 High 3900. Production varies based on effective precipitation and natural variability of soil properties for this ecological site.

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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:** Potential invasive (including noxious) species (native and non-native). Invasive species on this ecological site include (but not limited to) Kentucky bluegrass, Timothy, smooth brome, sulphur cinquefoil, houndstongue, white top, Canada thistle, dandelion, annual brome spp., spotted knapweed, leafy spurge, salsify, etc.

    Native species such as Rocky Mountain juniper, lupine, broom snakeweed, Sandberg's bluegrass, etc. when their populations are significant enough to affect ecological function, indicate site condition departure.

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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.
