USDA Natural Resources
Conservation Service

Ecological site R046XC511MT
Stony (St) RRU 46-C 13-19 PZ

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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.

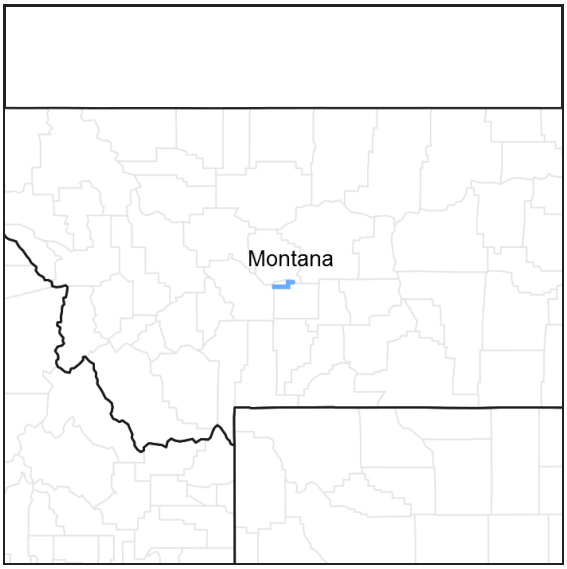


Figure 1. Mapped extent

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

R046XC504MT	**Overflow (Ov) RRU 46-C 13-19 PZ**
R046XC505MT	**Sandy (Sy) RRU 46-C 13-19 PZ**
R046XC508MT	**Silty (Si) RRU 46-C 13-19 PZ**
R046XC516MT	**Silty Steep (SiStp) RRU 46-C 13-19 PZ**

Similar sites

R046XC508MT	**Silty (Si) RRU 46-C 13-19 PZ** This site differs by not being covered by stones, or if there are surface stones present, they are less abundant (Class 1 or 2 stoniness).
R046XC505MT	**Sandy (Sy) RRU 46-C 13-19 PZ** This site differs by not being covered by stones, or if there are surface stones present, they are less abundant (Class 1 or 2 stoniness).

Table 1. Dominant plant species

Tree	Not specified

Shrub	Not specified
Herbaceous	(1) *Pseudoroegneria spicata* (2) *Festuca idahoensis*

Physiographic features

This ecological site occurs on nearly level to strongly sloping plains, terraces, and fans. The slopes range from 0–15%, but are mainly less than 8%. This site occurs on all exposures. Aspect is not significant.

Table 2. Representative physiographic features

Landforms	(1) Plain (2) Fan (3) Terrace
Flooding frequency	None
Ponding frequency	None
Slope	0–15%
Water table depth	102 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

No influencing water features.

Soil features

The soils are formed in alluvium, colluvium, residuum, or eolian deposits. These soils are loams, silt loams, very fine sandy loams, sandy loams, clay loams or sandy clay loams more than 20 inches deep having stones or boulders covering up to about 15% of the surface (Class 3 Stoniness). They include soils that have two inches or more of one of these textures over a clayey (argillic) subsoil. The presence of the surface stones interferes with the use of surface tillage implements, but usually has mimimal impact on production and species composition. Available Water Holding Capacity to a 40 inch depth is mostly about 8 inches.

Table 4. Representative soil features

Surface texture	(1) Loam (2) Silt loam (3) Sandy loam
Drainage class	Moderately well drained to well drained
Permeability class	Moderate
Soil depth	51 cm
Available water capacity (0-101.6cm)	12.7–20.32 cm
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Soil reaction (1:1 water) (0-101.6cm)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0–10%
Subsurface fragment volume >3" (Depth not specified)	0–5%

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 very few soil limitations for plant growth. Changes may occur to the Historic Climax Plant Community due to management actions and/or climatic conditions. Under continued adverse impacts, a moderate to extreme decline in vegetative vigor and composition will occur. Under favorable vegetative management treatments this site can more readily return to the Historic Climax Plant Community (HCPC).

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 bluebunch wheatgrass, little bluestem, and green/Columbia needlegrasses. These plants will typically be replaced by a mixture of medium and short grasses and sedges, including Idaho fescue, thickspike/western wheatgrass, needleandthread, Sandberg bluegrass, prairie junegrass, threadleaf sedge, and several species of more aggressive, less desirable forbs. Certain non-native species such as Kentucky or Canada bluegrass or common timothy can occupy this site, depending on circumstances and opportunity.

Continued deterioration to the community results in an abundance of short grasses such as prairie junegrass, Sandberg bluegrass, and oatgrasses, along with several species of weedy forbs.

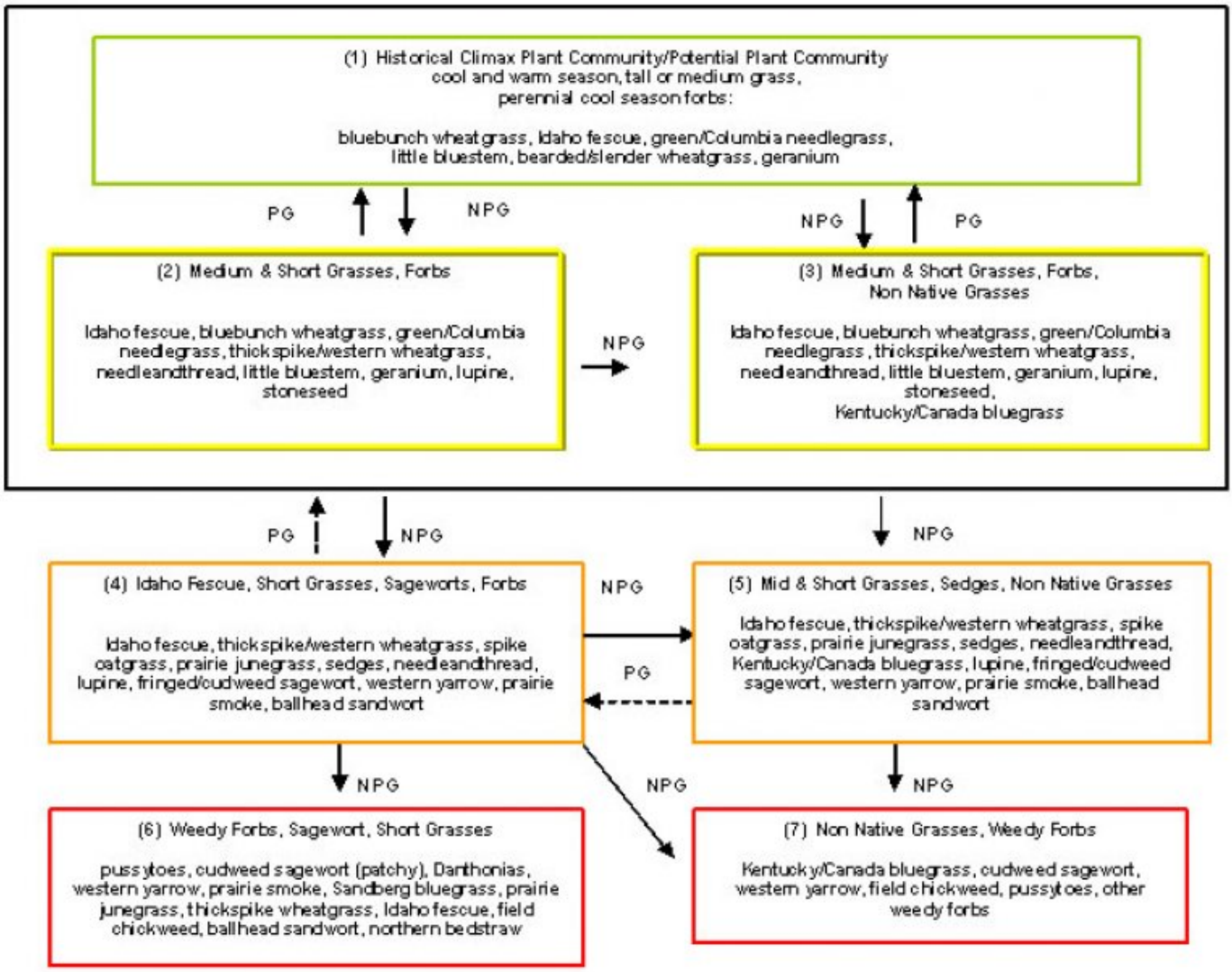
Plants that are not a part of the Historic Climax Plant Community that are most likely to invade are annual grasses (cheatgrass, Japanese brome), and annual and biennial forbs. Leafy spurge, knapweeds, sulphur cinquefoil, and

dalmation toadflax are potential noxious weed invaders on this site.

Long-term non-use (>3 years) combined with the absence of fire will result in excessive litter and decadent plants in the bunchgrass communities.

10a. Major Plant Community States and Thresholds : Following are descriptions of several plant communities that may occupy this site. Minor variations in the plant community will occur as an expression of climatic patterns, topography and landform, elevation, soils, fire pattern and history, and grazing.

State and transition model



NOTE: Kentucky and Canada bluegrass can become a part of any plant community in this ecological site, depending on factors such as site history, circumstances, and the opportunity for these plants to establish. Generally, the percent composition of these will increase as the ecological condition degrades until they will become dominant.

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.

Figure 8. State and Transition Model

State 1
Tall and Medium Grasses, Forbs

Community 1.1
Tall and Medium Grasses, Forbs

This is the interpretive plant community and is considered to be the Historic Climax Plant Community for this site. This plant community contains a high diversity of tall and medium height, cool season grasses (bluebunch wheatgrass, little bluestem, Idaho fescue, green/Columbia needlegrass, mountain brome) and short grasses (Cusick and Sandberg bluegrass, Parry danthonia, and prairie junegrass). There are abundant forbs (geraniums, mountain dandelion) which occur in smaller percentages. 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 (i.e., timing and amount of precipitation, and temperature). It is well suited to managed livestock grazing and provides diverse habitat for many wildlife species. Plants on this site have strong, healthy root systems that allow production to increase significantly with favorable moisture conditions. This plant community provides for soil stability and a properly 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. The soils associated with this site provide a favorable soil-water-plant relationship.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	1093	1418	1670
Forb	–	177	415
Shrub/Vine	–	45	106
Total	**1093**	**1640**	**2191**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	0-5%
Grass/grasslike foliar cover	75-90%
Forb foliar cover	1-10%
Non-vascular plants	0-1%
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	0-2%
Grass/grasslike basal cover	17-21%
Forb basal cover	1-3%
Non-vascular plants	0-1%
Biological crusts	0%
Litter	40-60%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	15-25%

Bedrock	0%
Water	0%
Bare ground	0-5%

State 2
Medium and Short Grasses, Sedge, and Increaser Forbs

Community 2.1
Medium and Short Grasses, Sedge, and Increaser Forbs

Early stages of degradation, including non-prescribed grazing, will tend to change the HCPC to a community dominated by medium and short grasses and sedges such as Idaho fescue, needleandthread (mainly 15 inches MAP or less), thickspike / western wheatgrass, threadleaf sedge, prairie junegrass Cusick and Sandberg bluegrass, and spike oatgrass. Most of the taller and more palatable plants (bluebunch wheatgrass, little bluestem, tall needlegrasses) will still be present but in smaller amounts. There may be an increase in the amount of some shrubs, such as shrubby cinquefoil. Palatable and nutritious forbs will be replaced by less desirable and more aggressive species such as lupine and stoneseed.

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

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

Given the right circumstances and opportunity, non-native grasses such as Kentucky/Canada bluegrass or common timothy will become established on this ecological site. In this situation, slight degradation in the historical climax plant community results in a plant community similar to #2, except that it will also have these non native plants as minor components. If further degradation continues, these species will continue to increase and replace other, more desirable native species. Biomass production and litter become slightly reduced on the site with Communities 2 and 3, 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. These plant communities provide for moderate soil stability. Increased amounts of bare ground can result in undesirable species invading. Common invaders can include spotted knapweed, leafy spurge, dalmation toadflax, and sulphur cinquefoil. These plant communities (2 & 3) will readily respond to improved grazing management, but a significant amount of time can be necessary to move them toward a higher successional stage and a more productive plant community similar to community 1. The following plant communities are the result of long-term, heavy, continuous season long grazing and/or heavy, annual, early spring grazing. Repeated spring grazing depletes stored carbohydrates, resulting in weakening and eventual death of the cool season tall and medium grasses. They can occur throughout the pasture, on spot grazed areas, and near water sources where season-long grazing patterns occur. It is critical at this point to consider implementing a change in grazing management to prevent further degradation to any of the following plant communities and minimize the increase of less desirable and non native species. Once any of the following communities become established, the potential to return to communities 1, 2, or 3 is reduced and often requires a significant amount of time along with economic inputs.

State 4
Idaho Fescue, Short Grasses, Sageworts, Forbs

Community 4.1
Idaho Fescue, Short Grasses, Sageworts, Forbs

With continued heavy disturbance on community 2, the site will become dominated by short increaser species such as Idaho fescue, thickspike or western wheatgrass, Parry danthonia, prairie junegrass, sedges, needleandthread (15 inches MAP or less), fringed and/or cudweed sagewort, and perennial forbs such as lupine, western yarrow, prairie smoke and ballhead sandwort. There may still be remnant amounts of some of the late-seral species such as

bluebunch wheatgrass and green/Columbia needlegrass present. The taller grasses will occur only occasionally, often within horizontal juniper plants. Palatable forbs will be mostly absent. Shrubby cinquefoil can become a significant component, particularly in the higher moisture areas (> 17 inches precipitation) of this MLRA/RRU. 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 5
Mid and Short Grasses, Sedges, Non-Native Grasses

Community 5.1
Mid and Short Grasses, Sedges, Non-Native Grasses

As heavy disturbance continues, plant community 3 deteriorates to one similar to community number 4, except that non-native bluegrasses (Kentucky/Canada) and/or common timothy become more abundant, often comprising up to about 25 percent of the composition. These last 2 plant communities (4 & 5) are often less productive than Plant Communities 1, 2, or 3. The lack of litter and short plant heights result in higher soil temperatures, poor water infiltration rates, and higher evapotranspiration rates, 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. Plant Communities 4 and 5 have a high percentage of aggressive, less-desirable species, including Kentucky or Canada bluegrass or timothy. Once these have become established, it is significantly more difficult using grazing management alone to restore the site to one that resembles the HCPC. It becomes critical at this point to implement a grazing strategy that will restore the stability and health of the site. Rest, usually for a number of years, can sometimes help with re-establishment of the desired species, depending on the amount of desirable species remaining. There are limitations to using seeding and/or mechanical treatment on this site due to the abundance of stones on these soils.

State 6
Weedy Forbs, Sageworts, Short Grasses, Creeping Juniper

Community 6.1
Weedy Forbs, Sageworts, Short Grasses, Creeping Juniper

If community 4 deteriorates further due to non-prescribed grazing or other disturbance, it becomes dominated by weedy forbs (pussytoes, cudweed sagewort, western yarrow, prairie smoke, field chickweed, northern bedstraw and ballhead sandwort), short grasses (Sandberg bluegrass, and prairie junegrass), and half shrubs such as fringed sagewort. There is often a remnant amount of some of the mid-seral grasses such as thickspike wheatgrass and Idaho fescue, usually widely spaced. Creeping juniper can become abundant in the northern part of this MLRU. Frequently, a remnant population of climax species such as bluebunch wheatgrass, tall needlegrasses, and little bluestem will occur within the creeping juniper.

State 7
Non-Native Grasses, Weedy Forbs, Clubmoss

Community 7.1
Non-Native Grasses, Weedy Forbs, Clubmoss

Further deterioration of community 5 due to non-prescribed grazing or other disturbance leads to a plant community dominated by Kentucky/Canada bluegrass and/or common timothy, often comprising up to 80 % of the community. Weedy forbs including field chickweed, cudweed sagewort, and pussytoes are abundant and typically comprise the rest of the plant composition. A thick cover of dense clubmoss often completes this community. Occasionally, in places receiving 17 inches or greater precipitation, some short lived native species such as mountain brome can become dominant after major disturbance from grazing or rodent (pocket gopher mainly) activity. Plant communities 6 and 7 produce less usable forage for wildlife and livestock than the others 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. A thick canopy cover of creeping juniper often results in precipitation being intercepted, thus not reaching the soil. Most of the attributes of a healthy rangeland, including good infiltration, minimal erosion and runoff, nutrient cycling and energy flow, have been lost. These communities can respond positively to improved grazing management. Significant economic inputs are needed, along with extended rest and prescribed grazing management, to restore them to a higher successional stage. However, because of the stoniness associated with this ecological site, practices such as mechanical treatment or seeding are generally not feasible nor recommended.

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**			0–106	
	Shrub, broadleaf	2SB	*Shrub, broadleaf*	0–36	–
	prairie sagewort	ARFR4	*Artemisia frigida*	0–36	–
	shrubby cinquefoil	DAFRF	*Dasiphora fruticosa ssp. floribunda*	0–36	–
	prairie rose	ROARS	*Rosa arkansana var. suffulta*	0–36	–
Grass/Grasslike					
0	**Grasses and Grasslikes**			1093–1670	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	549–1250	–
	little bluestem	SCSCS	*Schizachyrium scoparium var. scoparium*	0–628	–
	Idaho fescue	FEID	*Festuca idahoensis*	135–314	–
	Columbia needlegrass	ACNEN2	*Achnatherum nelsonii ssp. nelsonii*	34–109	–
	green needlegrass	NAVI4	*Nassella viridula*	34–109	–
	Cusick's bluegrass	POCU3	*Poa cusickii*	0–106	–
	Sandberg bluegrass	POSE	*Poa secunda*	55–106	–
	Grass, perennial	2GP	*Grass, perennial*	0–106	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	0–106	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	55–106	–
	mountain brome	BRMA4	*Bromus marginatus*	0–106	–
	needleleaf sedge	CADU6	*Carex duriuscula*	55–106	–
	threadleaf sedge	CAFI	*Carex filifolia*	55–106	–
	sun sedge	CAINH2	*Carex inops ssp. heliophila*	55–106	–
	plains reedgrass	CAMO	*Calamagrostis montanensis*	55–106	–
	Parry's oatgrass	DAPA2	*Danthonia parryi*	0–106	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	0–104	–
	western wheatgrass	PASM	*Pascopyrum smithii*	0–104	–
	purple threeawn	ARPU9	*Aristida purpurea*	0–1	–
	Fendler's threeawn	ARPUF	*Aristida purpurea var. fendleriana*	0–1	–
Forb					
0	**Forbs**			0–415	

	leafy wildparsley	MUDI	*Musineon divaricatum*	0–106	–
	beardtongue	PENST	*Penstemon*	0–106	–
	spiny phlox	PHHO	*Phlox hoodii*	0–106	–
	scurfpea	PSORA2	*Psoralidium*	0–106	–
	cutleaf anemone	PUPAM	*Pulsatilla patens ssp. multifida*	0–106	–
	prairie thermopsis	THRH	*Thermopsis rhombifolia*	0–106	–
	American vetch	VIAM	*Vicia americana*	0–106	–
	Forb, perennial	2FP	*Forb, perennial*	0–106	–
	western yarrow	ACMIO	*Achillea millefolium var. occidentalis*	0–106	–
	pale agoseris	AGGL	*Agoseris glauca*	4–106	–
	onion	ALLIU	*Allium*	0–106	–
	pussytoes	ANTEN	*Antennaria*	0–106	–
	aster	ASTER	*Aster*	0–106	–
	milkvetch	ASTRA	*Astragalus*	0–106	–
	balsamroot	BALSA	*Balsamorhiza*	0–106	–
	Bonneville shootingstar	DOCO	*Dodecatheon conjugens*	4–106	–
	fleabane	ERIGE2	*Erigeron*	0–106	–
	yellow fritillary	FRPU2	*Fritillaria pudica*	0–106	–
	Richardson's geranium	GERI	*Geranium richardsonii*	4–106	–
	old man's whiskers	GETR	*Geum triflorum*	0–106	–
	sticky purple geranium	GEVIV	*Geranium viscosissimum var. viscosissimum*	4–106	–
	western stoneseed	LIRU4	*Lithospermum ruderale*	0–106	–
	desertparsley	LOMAT	*Lomatium*	0–106	–
	lupine	LUPIN	*Lupinus*	0–1	–
	larkspur	DELPH	*Delphinium*	0–1	–
	deathcamas	ZIGAD	*Zigadenus*	0–1	–

Animal community

Livestock Grazing Interpretations: Managed livestock grazing is suitable on this site as it has the potential to produce a moderate amount of high quality forage. 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 over stocking and season-long use 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 through 7, 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 or 3 (medium and short grasses) occur, grazing management strategies that will prevent further degradation need to be implemented. These communities are still stable, productive, and healthy provided they receive proper management. They will respond fairly quickly to improved grazing management, including increased growing season rest of key forage plants. Grazing management alone can usually move these back towards the potential / historic climax community.

Plant communities 4 through 7 are 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. These communities 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. Rest, usually for a number of years, can sometimes help with re-establishment of the desired species, depending on the amount of desirable species remaining.

Communities 6 and 7 have a high percentage of aggressive, less-desirable species and have lost most of the attributes of a healthy rangeland, including good infiltration, minimal erosion and runoff, nutrient cycling and energy use. Once this site is occupied by these communities it will be more difficult to restore it to a community that resembles the potential with grazing management alone. Additional growing season rest combined with accelerated practices (e.g. range seeding, chiseling) are often necessary for re-establishment of the desired species and to restore the stability and health of the site. However, there are limitations to using seeding and/or mechanical treatment on this site due to the stony soils.

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).

Hydrological functions

The soils associated with this ecological site are generally in Hydrologic Soil Group B. The infiltration rates for these soils will normally be moderate. The runoff potential for this site is moderate, depending on slope and ground cover/health. Runoff curve numbers generally range from 64 to 82.

Good hydrologic conditions exist on rangelands if plant cover (grass, litter, and brush canopy) 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, 4 and 5) are generally considered to be in poor hydrologic condition as a majority of the plant cover is from shallow-rooted species such as blue grama and annual grasses.

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 some recreational 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 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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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.

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 10-15%. It consists of small, randomly scattered patches.

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 4-6 under plant canopies and plant interspaces. The A horizon is 2-5 inches thick.

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 2-5 inches thick with color, when wet, typically ranging in Value of 4 or less and Chroma of 3 or less.

   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 Stony ecological site is slow however the site is well drained. An even distribution of mid stature grasses (75-80%), cool season bunchgrasses (10-15%) along with rhizomatous grass (<5%), forbs (5-15%), and shrubs (0-3%)

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 (Primarily bluebunch wheatgrass)

    Sub-dominant: shortgrass grasses/grasslikes (needleanthread, Idaho fescue) ≥ forbs > rhizomatous grasses >> Shrubs

    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 40-60%. 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 1463. Low: 975 High 1955. 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) sulphur cinquefoil, houndstongue, whitetop, Canada Thistle, annual brome spp., spotted knapweed, yellow toadflax, leafy spurge, crested wheatgrass, Kentucky bluegrass
    Native species such as Rocky Mountain juniper, ponderosa pine, Douglas fir, 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.
