USDA Natural Resources
Conservation Service

Ecological site R046XC508MT
Silty (Si) 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.

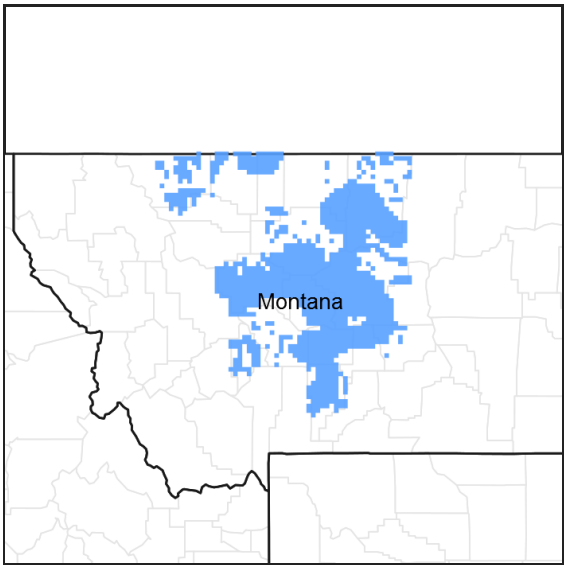


Figure 1. Mapped extent

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**
R046XC506MT	**Shallow (Sw) RRU 46-C 13-19 PZ**
R046XC507MT	**Shallow to Gravel (SwGr) RRU 46-C 13-19 PZ**
R046XC514MT	**Gravelly (Gr) RRU 46-C 13-19 PZ**
R046XC517MT	**Very Shallow (VSw) RRU 46-C 13-19 PZ**
R046XC598MT	**Shallow Clay (SwC) RRU 46-C 13-19 PZ**

Similar sites

R046XC505MT	**Sandy (Sy) RRU 46-C 13-19 PZ** The Sandy sitesoccupies the same landscape positions; the primary difference is soil texture and plant community.
R046XC507MT	**Shallow to Gravel (SwGr) RRU 46-C 13-19 PZ** The Shallow to Gravel site differs by being 20 inches or less to a restrictive layer or bedrock and having significantly lower production and ground cover.

R046XC506MT	**Shallow (Sw) RRU 46-C 13-19 PZ** The Shallow site differs by being 20 inches or less to a restrictive layer or bedrock and having significantly lower production and ground cover.

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 plains, fans, and terraces. The slopes range from 0 - 15%, but are typically less than 8%. Apsect 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	107–183 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

These soils are loams, silt loams, very fine sandy loams, or sandy clay loams more than 20 inches deep. They include soils that have two inches or more of one of these textures over a clayey (argillic) subsoil. There are no significant limitations to plant growth. Available Water Holding Capacity to a 40 inch depth is mostly about 8 inches.

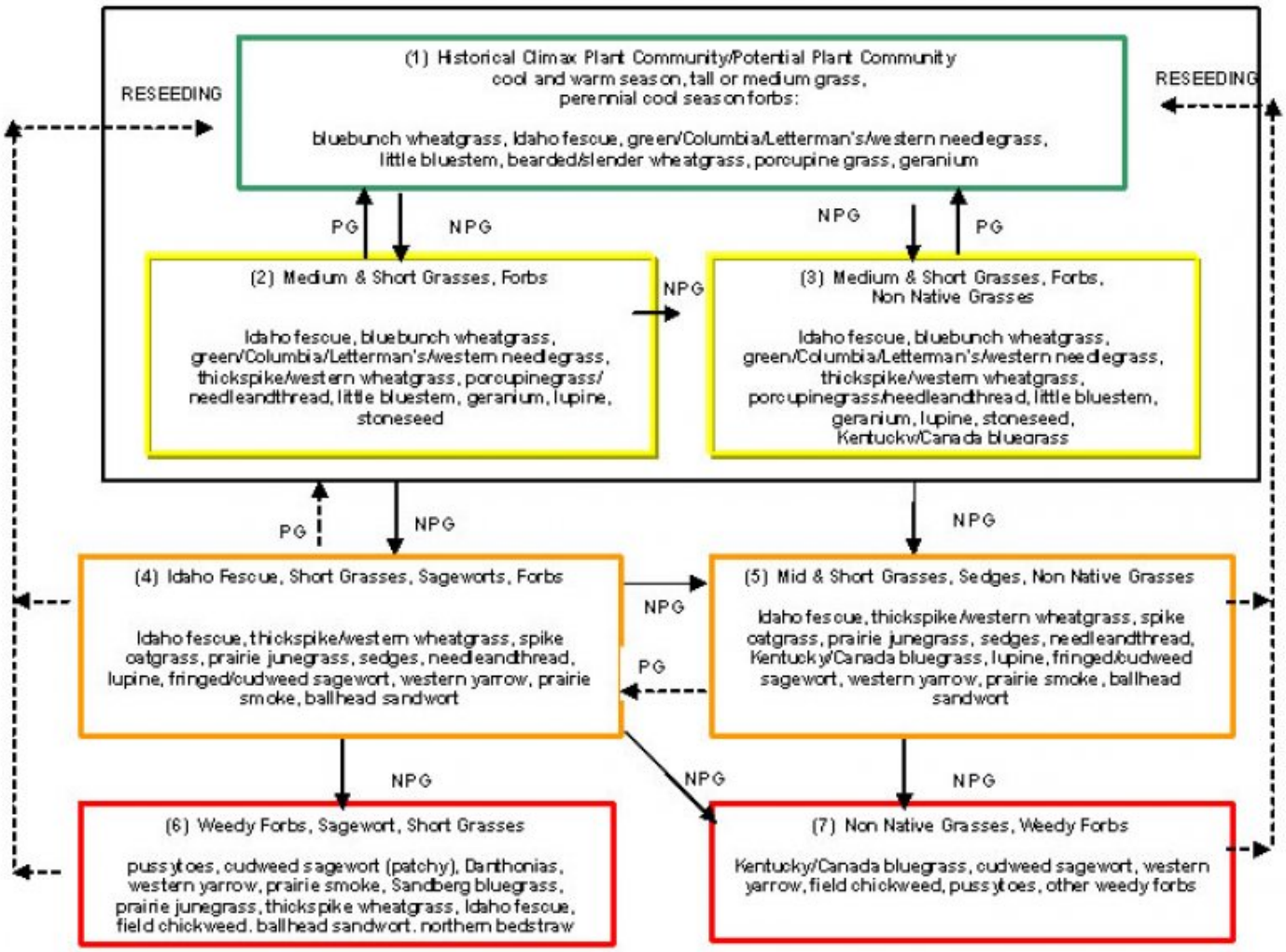
Table 4. Representative soil features

Surface texture	(1) Loam (2) Silt loam (3) Very fine sandy loam
Family particle size	(1) Clayey
Soil depth	51–183 cm
Available water capacity (0-101.6cm)	17.78–20.32 cm

Ecological dynamics

Following are descriptions of several plant communities that may occupy this site. The physical aspect of this site in the Historical Climax (HCPC) is that of a level to rolling grassland dominated by cool season bunchgrasses, with several species of forbs occuring in small percentages. 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 and common timothy 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.

MECHANICAL TREATMENT: e.g., chiseling or ripping

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 and warm season grasses

(bluebunch wheatgrass, Idaho fescue, green/Columbia/Letterman's/western needlegrass, little bluestem, bearded/slender wheatgrass, porcupinegrass), and short grasses (Cusick and Sandberg bluegrass, spike oatgrass, and prairie junegrass). There are abundant forbs (geranium, prairie clovers) 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. These plants have strong, healthy root systems that allow production to increase significantly with favorable growing 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 very 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	1471	1847	2224
Forb	368	462	556
Shrub/Vine	–	–	1
Total	**1839**	**2309**	**2781**

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	0-5%
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	20-25%
Forb basal cover	1-5%
Non-vascular plants	0-2%
Biological crusts	0%
Litter	60-70%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%

Bare ground	0-1%

State 2
Medium and Short Grasses, Forbs

Community 2.1
Medium and Short Grasses, Forbs

Early stages of degradation, including non-prescribed grazing, will tend to change the HCPC to a community composition with more medium and short increaser grasses such as Idaho fescue, needleandthread (mainly 15 inches MAP or less), thickspike/western wheatgrass, Cusick and Sandberg bluegrass, spike oatgrass, and prairie junegrass,. Most of the taller, more palatable grasses (bluebunch wheatgrass, tall needlegrasses, porcupinegrass, little bluestem) will still be common but in smaller amounts. Palatable and nutritious forbs will begin to 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 leafy spurge, dalmation toadflax, and sulphur cinquefoil. 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. These plant communities 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 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. Palatable forbs will be mostly absent. Shrubby cinquefoil can become a significant component of this community, particularly in the higher moisture areas (generally 17 inches or more) of this MLRA/RRU.

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 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. Communities 4 and 5 will respond positively to improved grazing management, but significant economic inputs and time will usually also be needed to move them toward a higher successional stage. Once plants such as Kentucky or Canada bluegrass or timothy become established, they are very difficult to remove and replace by grazing management alone. Additionally, the chances for success are significantly reduced.

State 6
Weedy Forbs, Sageworts, Short Grasses

Community 6.1
Weedy Forbs, Sageworts, Short Grasses

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) and 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.

State 7
Non-Native Grasses, Weedy Forbs

Community 7.1
Non-Native Grasses, Weedy Forbs

Further deterioration of community 4 or 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 25 to 60 % of the community. Weedy forbs including field chickweed, cudweed sagewort, and pussytoes are abundant and typically comprise the rest of the plant composition. 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 have extremely reduced production of desirable native plants. The lack of litter and short plant heights result in higher soil surface temperatures, poor water infiltration rates, and increased evaporation, which gives short grasses, weedy forbs, and invader species a competitive advantage over the cool season tall and medium grasses. These communities have lost most of the attributes of a healthy rangeland, including good infiltration, minimal runoff and erosion, nutrient cycling and energy flow. Significant economic inputs such as seeding and/or mechanical treatment practices are needed, along with extended rest and prescribed grazing management, to restore these plant communities to a higher successional stage.

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**			0–1	
	Shrub, broadleaf	2SB	*Shrub, broadleaf*	0–1	–
	silver sagebrush	ARCA13	*Artemisia cana*	0–1	–

	prairie sagewort	ARFR4	*Artemisia frigida*	0–1	–
Grass/Grasslike					
0	**Grasses and Sedges**			1471–2224	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	735–1946	–
	little bluestem	SCSCD	*Schizachyrium scoparium var. divergens*	0–556	–
	Idaho fescue	FEID	*Festuca idahoensis*	92–417	–
	porcupinegrass	HESP11	*Hesperostipa spartea*	0–278	–
	plains muhly	MUCU3	*Muhlenbergia cuspidata*	92–278	–
	needle and thread	HECOC8	*Hesperostipa comata ssp. comata*	0–215	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	46–139	–
	slender wheatgrass	ELTRS	*Elymus trachycaulus ssp. subsecundus*	0–139	–
	slender wheatgrass	ELTRT	*Elymus trachycaulus ssp. trachycaulus*	0–139	–
	western wheatgrass	PASM	*Pascopyrum smithii*	46–139	–
	Cusick's bluegrass	POCU3	*Poa cusickii*	0–139	–
	mountain brome	BRMA4	*Bromus marginatus*	0–139	–
	needleleaf sedge	CADU6	*Carex duriuscula*	0–94	–
	threadleaf sedge	CAFI	*Carex filifolia*	0–94	–
	plains reedgrass	CAMO	*Calamagrostis montanensis*	0–94	–
	poverty oatgrass	DASP2	*Danthonia spicata*	0–94	–
	Grass, perennial	2GP	*Grass, perennial*	0–94	–
	Sandberg bluegrass	POSE	*Poa secunda*	0–94	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–94	–
	green needlegrass	NAVI4	*Nassella viridula*	24–69	–
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	24–69	–
	Columbia needlegrass	ACNEN2	*Achnatherum nelsonii ssp. nelsonii*	24–69	–
	western needlegrass	ACOCO	*Achnatherum occidentale ssp. occidentale*	24–69	–
	purple threeawn	ARPU9	*Aristida purpurea*	0–1	–
	Fendler's threeawn	ARPUF	*Aristida purpurea var. fendleriana*	0–1	–
Forb					
0	**Forbs**			368–556	
	leafy wildparsley	MUDI	*Musineon divaricatum*	0–139	–
	beardtongue	PENST	*Penstemon*	0–139	–
	scurfpea	PSORA2	*Psoralidium*	0–139	–
	cutleaf anemone	PUPAM	*Pulsatilla patens ssp. multifida*	0–139	–
	upright prairie coneflower	RACO3	*Ratibida columnifera*	3–139	–
	prairie thermopsis	THRH	*Thermopsis rhombifolia*	0–139	–
	American vetch	VIAM	*Vicia americana*	0–139	–
	Forb, perennial	2FP	*Forb, perennial*	0–139	–
	western yarrow	ACMIO	*Achillea millefolium var. occidentalis*	0–139	–
	pale agoseris	AGGL	*Agoseris glauca*	0–139	–

	onion	ALLIU	*Allium*	0–139	–
	pussytoes	ANTEN	*Antennaria*	0–139	–
	white sagebrush	ARLU	*Artemisia ludoviciana*	0–139	–
	aster	ASTER	*Aster*	0–139	–
	milkvetch	ASTRA	*Astragalus*	0–139	–
	balsamroot	BALSA	*Balsamorhiza*	0–139	–
	prairie clover	DALEA	*Dalea*	3–139	–
	Bonneville shootingstar	DOCO	*Dodecatheon conjugens*	0–139	–
	yellow fritillary	FRPU2	*Fritillaria pudica*	0–139	–
	blanketflower	GAAR	*Gaillardia aristata*	3–139	–
	old man's whiskers	GETR	*Geum triflorum*	0–139	–
	sticky purple geranium	GEVI2	*Geranium viscosissimum*	3–139	–
	western stoneseed	LIRU4	*Lithospermum ruderale*	0–139	–
	desertparsley	LOMAT	*Lomatium*	0–139	–
	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 an abundance of high quality forage. This is often a preferred site for grazing by livestock, and animals tend to congregate in these areas. In order to maintain the productivity of the Silty 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 over stocking and season-long use of this site can be detrimental and will alter the plant composition and production over time, resulting in plant communities that resemble numbers 4 through 7. 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.

Whenever Plant Communities 2 or 3 (Medium and short grasses) occur, grazing management strategies need to be implemented to avoid further deterioration. These communities are still stable, productive, and healthy provided they receive proper management. These 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, particularly if the non native grasses such as Kentucky/Canada bluegrass and/or common timothy, are not significant components.

Plant Communities 4 and 5 have substantially reduced forage production and a high percentage of aggressive, less-desirable species. Once these have become established, it is significantly more difficult using grazing management alone to restore the site to one that resembles the HCPC/PPC. Reseeding and/or mechanical treatment are sometimes needed along with additional growing season rest for re-establishment of the desired species and to restore the stability and health of the site, especially with Community 5 having a relatively high percentage of non native perennial grasses.

Plant Communities 6 and 7 have extremely limited production of usable forage (< 400 pounds per acre). Community 6 has a high percentage of non desirable forage species. Community 7 has a high amount of non native perennial grasses that can be good forage, but generally for only a short time during the early part of the grazing season. The bluegrasses and timothy are highly competitive once established, making seeding usually necessary to restore desirable native perennial species.

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 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: The Silty ecological site occurs over large acreages on the Northern Rocky Mountain foothills except where it is fragmented by conversion to cropland, which is significant in many areas. Habitat fragmentation of this site has contributed to the decline of some “area sensitive” wildlife species, particularly such ground-nesting birds as the grasshopper sparrow. This site is home to a diverse native wildlife complex. Historically, huge herds of migratory bison and pronghorn as well as large numbers of sharp-tailed grouse were probably the dominant “game” species in addition to a wide variety of ground-nesting songbirds, waterfowl and shorebirds, small mammals, and mammalian predators. Grazing patterns, topographic diversity, extensive acreages, and interspersion with other ecological sites make this type very important to numerous wildlife species. Small mammal diversity and abundance is high which, in turn, supports a varied raptor population. In the past, vast prairie dog towns provided habitat for such species as the black-footed ferret, burrowing owl, mountain plover, ferruginous hawk, and swift fox. Invasive plant species such as leafy spurge, Canada thistle, and several knapweeds contribute to a loss of biodiversity within this ecological site. Wildlife water requirements are provided by springs and seeps, intermittent and perennial streams, and, in modern times, numerous artificial ponds and livestock pipelines. These areas are locally important for northern leopard frogs, tiger salamanders and a number to toad species, all of which feed on a variety of insects. Grazing, fire, drought cycles and insect population fluctuations create a shifting mosaic of wildlife habitats across this site.

Plant Community 1: Tall and Medium Grasses, Forbs (HCPC): The diversity of plant species and life forms provides feeding substrate for pollinating insects. Grasshopper and Morman cricket infestations occasionally consume the majority of the herbaceous vegetation, especially during drought years. A variety of warm and cool water fish species inhabit the intermittent and perennial streams associated with this community. Northern pike, lake chub, carp, a variety of suckers and walleye are examples. Common reptile and amphibian species include tiger salamanders in ponds and stock tanks, Woodhouse's toad, western chorus frogs, short-horned lizards, bull snake and rattlesnake, and three species of garter snakes. The diversity of grass stature and life forms, along with scattered shrubs and a variety of forbs, provides habitat for many bird species including the upland sandpiper, sharp-tailed grouse, loggerhead shrike, grasshopper and savanna sparrow, chestnut-collared longspur and western meadowlark. This community is especially favorable for ground-nesting birds because of the abundant residual plant material and litter available for nesting, escape, and thermal cover. Diverse prey populations are available for raptors such as ferruginous and Swainson's hawks. The predominance of grasses plus a diversity of forbs, shrubs and half-shrubs in this community favors grazers and mixed feeders such as bison, pronghorn and elk. Suitable thermal and escape cover for mule deer is limited because of low shrub cover. Complex plant structural diversity and litter cover provide habitat for a wide array of small mammals (both seed eaters, i.e. deer mice and herbivores, i.e. voles and jackrabbits) and neotropical migratory birds.

Plant Community 2: Medium and Short Grasses, Forbs: The partial loss of structural diversity makes this plant community somewhat less attractive to the variety of wildlife species using the HCPC. A decrease in residual plant material and litter cover is usually associated with degradation of the HCPC, which makes this community less attractive for ground-nesting birds. Pronghorn make considerable use of this type because of forb and half-shrub availability in the generally open landscape.

Plant Community 3: Medium and Short Grasses, Forbs, Non Native Grasses: Wyoming big sagebrush, with canopy cover of 15-30%, and an understory of grasses and forbs, is excellent nesting, winter, brood-rearing, and foraging habitat for sage grouse. Other obligate sagebrush-grassland species, notably Brewer's sparrow, also benefit from an increase in sagebrush cover. When residual grass and litter cover decrease in this community, ground nesting bird habitat values decline. This community often provides important winter range for mule deer and pronghorn. The sagebrush crowns break up hard crusted snow and provide about 15% protein and 40-60% digestibility for ungulates.

Plant Community 4: Idaho Fescue, Short Grasses, Sageworts, Forbs: Heavy stands of big sagebrush can provide winter cover and foraging habitat for mule deer, elk, pronghorn, and sage grouse. However, a decline in herbaceous cover and litter reduces overall wildlife species diversity and habitat value for ground-nesting birds. When this seral stage is dominated by forbs and fringed sagewort, it may provide lek sites for sage grouse and habitat for birds such as horned larks, McCown's longspurs, mountain plovers, and long-billed curlews. Prairie dogs will have an easier time establishing and expanding towns in this community to the benefit of burrowing owls, mountain plovers, and black-footed ferrets.

Plant Community 5: Mid and Short Grasses, Sedges, Non Native Grasses: Sparse vegetation and a greater percent cover of bare ground provides suitable habitat for mountain plovers, prairie dogs, horned larks and McCown's longspurs. However, a lack of complex vegetation structure and residual cover makes this community poor habitat in general for most ground-nesting birds and relatively poor big game habitat. Pronghorn may forage in this community spring though fall.

Plant Community 6: Weedy Forbs, Sageworts, Short Grasses: This community has low habitat value for most wildlife species except when it occurs in prairie dog towns. It may be important in providing lek sites for sage grouse when adjacent to sagebrush stands and provides forage for pronghorn seasonally.

Plant Community 7: Non Native Grasses, Weedy Forbs: When big sagebrush cover exceeds about 15 percent, this community may provide winter sage grouse habitat; nest cover for sage grouse is poor because of a lack of standing herbaceous material and surface litter. Lek sites for sage and sharp-tailed grouse may be available in this type. General wildlife habitat is of low value.

Hydrological functions

The runoff potential for this site is low to moderate, depending on slope and ground cover/health. Runoff curve numbers generally range from 78 to 90. The soils associated with this ecological site are generally in Hydrologic Soil Group C. The infiltration rates for these soils will normally be moderate to moderately rapid.

Contributors

JGS, MJR, BLG, REL, POH,
Matt Ricketts
NRCS

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 K. Walstad
Contact for lead author	grant.petersen@usda.gov
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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 low (0-5 percent). 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 5-6 under plant canopies and plant interspaces. The A horizon is 6-8 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 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. 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 Silty ecological site is high and the site is well drained. An even distribution of mid stature grasses (70-75%) of site production, cool season shortgrass (15-20%) along with a mix of rhizomatous grasses (5-10%), forbs (5-10%), and shrubs (0-1%).

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, green needlegrass)

    Sub-dominant: shortgrass grasses/grasslikes (needle and thread, Idaho Fescue, plains muhly) > rhizomatous grass (thickspike) > 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 55 to 65%. Most litter is irregularly distributed on the soil surface and is not at a measurable depth.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Average annual production is 2060. Low: 1640 High 2481. 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) Kentucky bluegrass, Timothy, smooth brome, sulphur cinquefoil, houndstongue, white top, Canada Thistle, dandelion, annual brome spp., spotted knapweed, salisify, leafy spurge, crested wheatgrass, etc.
    Native species such as fringed sagewort, 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.

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.