

Ecological site R043BY434WY **Rocky Hills (RH) 15-19" Northern Plains Precipitation Zone**

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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.

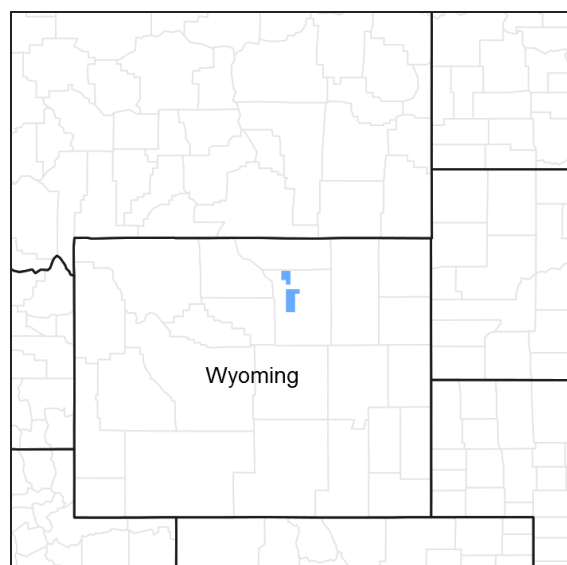


Figure 1. Mapped extent

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

R043BY408WY	Coarse Upland (CU) 15-19" Northern Plains Precipitation Zone
R043BY462WY	Shallow Loamy (SwLy) 15-19" Northern Plains Precipitation Zone
R043BY476WY	Very Shallow (VS) 15-19" Northern Plains Precipitation Zone

Similar sites

R058BY176WY	Very Shallow (VS) 10-17" PZ Very Shallow 10-14" Northern Plains P.Z., has lower production
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Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site will usually occur in an upland position on moderate to steep slopes.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Ridge
Flooding frequency	None
Ponding frequency	None
Elevation	1,128–2,286 m
Slope	0–60%
Ponding depth	0 cm
Aspect	Aspect is not a significant factor

Climatic features

Annual precipitation ranges from 15" to 19" per year. May is generally the wettest month. July, August and September are somewhat drier with daily amounts rarely exceeding one inch. Snowfall is quite heavy in the mountainous area. Annual snowfall averages close to 70 inches.

Sunshine is abundant in the latter part of the summer, the greatest amount being in July and August. Sunshine possibility during these two months averages 70 to 75% possibility with only a 65% possibility for June and September. Winter averages about 40% sunshine.

Because of the varied topography, the wind will vary considerably for different parts of the area. The wind is usually much lighter at the lower elevations and in the valleys as compared with the higher terrain. The average winter wind velocity is 8.5 mph, while the summer wind velocity averages 7.5 mph. Winds during storms and on ridges may exceed 45 mph.

Temperatures show a wide range between summer and winter, and between daily maximums and minimums. Summer nights are cool and temperatures drop into the forties at most places before sunrise. Summer daytime temperatures are usually in the seventies and occasionally reach eighty, but rarely reach the mid nineties. Winters are cold with daily lows below freezing most of the time. January has the coldest temperatures with a range of near 10 deg. F at night to the mid thirties in the afternoon. Temperatures of well below zero to –30 deg. F are not uncommon in the winter months.

The growing season for the cool season plants will generally start about April 15 to May 1 and continue to about October 10.

The following information is from the "Sheridan Airport" climate station:

Frost-free period (32 °F): 95-156 days; (5 yrs. out of 10, these days will occur between May 21 – September 19)

Freeze-free period 28 °F): 116-187 days; (5 yrs. out of 10, these days will occur between May 4 – September 29)

Mean annual precipitation: 14.7 inches

Mean annual air temperature: 45.0 °F (31.2 °F Avg. Min. – 58.8 °F Avg. Max.)

For detailed information visit the Natural Resources Conservation Service National Water and Climate Center at <http://www.wcc.nrcs.usda.gov/> website. Other climate station(s) representative of this precipitation zone include: "Parkman 5 WNW"

Table 3. Representative climatic features

Frost-free period (average)	156 days
Freeze-free period (average)	187 days
Precipitation total (average)	483 mm

Influencing water features

Stream type: None

Soil features

These soils are shallow, well drained, sandy, and loamy underlain by soft calcareous materials, with many outcrops of sedimentary bedrock. Deep pockets of soil may occur between the outcrops of bedrock.

Table 4. Representative soil features

Surface texture	(1) Loam (2) Silt loam (3) Very fine sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained to excessively drained
Permeability class	Slow to very rapid
Soil depth	25–51 cm
Surface fragment cover <=3"	0–20%
Surface fragment cover >3"	0–20%
Available water capacity (0-101.6cm)	0.76–5.08 cm
Calcium carbonate equivalent (0-101.6cm)	0–35%
Electrical conductivity (0-101.6cm)	0–4 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–5
Soil reaction (1:1 water) (0-101.6cm)	6.6–9
Subsurface fragment volume <=3" (Depth not specified)	0–15%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

As this site deteriorates from improper grazing management, species such as Sandberg bluegrass and bare ground will increase. Species such as cheatgrass will invade. Mountain mahogany will become shorter and assume a hedged look. Cool season grasses such as bluebunch wheatgrass, spike fescue, western wheatgrass and Columbia needlegrass will decrease in frequency and production.

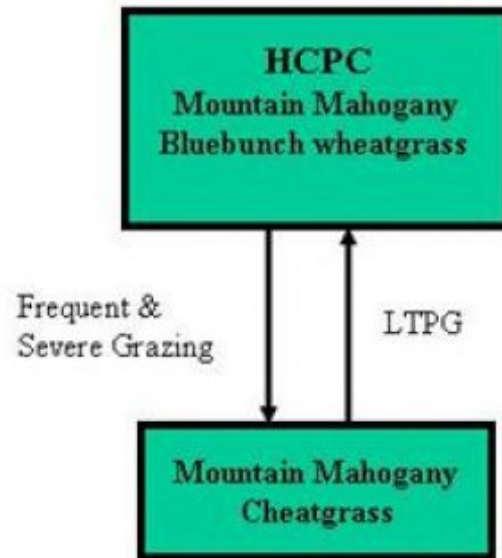
The Historic Climax Plant Community (description follows the plant community diagram) has been determined by study of rangeland relic areas, or areas protected from excessive disturbance. Trends in plant communities going from heavily grazed areas to lightly grazed areas, seasonal use pastures, and historical accounts have also been used.

The following is a State and Transition Model Diagram that illustrates the common plant communities (states) that can occur on the site and the transitions between these communities. The ecological processes will be discussed in more detail in the plant community narratives following the diagram.

State and transition model

Site Type: Rangeland
MLRA: 43BY – Central Rocky Mountains

Rocky Hills 15-19"NP P.Z.
R043BY434WY



BM - Brush Management (fire, chemical, mechanical)

Freq. & Severe Grazing - Frequent and Severe Utilization of the Cool-season Mid-grasses during the Growing Season

GLMT - Grazing Land Mechanical Treatment

LTPG - Long-term Prescribed Grazing

MCSLG - Moderate, Continuous Season-long Grazing

NU, NF - No Use and No Fire

PG - Prescribed Grazing (proper stocking rates with adequate recovery periods during the growing season)

VLTPG - Very Long-term Prescribed Grazing (could possibly take generations)

Na - found adjacent to a saline site

State 1
Mountain Mahogany/ Bluebunch Wheatgrass Plant Community

Community 1.1
Mountain Mahogany/ Bluebunch Wheatgrass Plant Community

The interpretive plant community for this site is the Historic Climax Plant Community. This site evolved with grazing by large herbivores and is well suited for grazing by wildlife and provides limited summer and fall grazing for domestic livestock. This state is critical winter habitat for mule deer and elk. Potential vegetation is about 45% grasses or grass-like plants, 10% forbs, and 45% woody plants. The state is dominated by mountain mahogany which may have up to 50% canopy cover. Other shrubs on this state may be big sagebrush, rubber rabbitbrush skunkbush sumac, juniper and ponderosa pine. The major grasses include bluebunch wheatgrass, rhizomatous wheatgrasses, Columbia needlegrass and spike fescue. Other grasses occurring on the site include prairie junegrass, Canby bluegrass, Sandberg bluegrass, needleandthread and threadleaf sedge. Annual production on this state ranges from 600 to 1000 pounds depending on climatic conditions. This plant community is extremely stable and well adapted to the Northern Great Plains climatic conditions. The diversity in plant species allows for high drought tolerance. This is a sustainable plant community (site/soil stability, watershed function, and biologic integrity). Transitions or pathways leading to other plant communities are as follows: Heavy, continuous improper grazing will convert the plant community to the Mountain magogany/Cheatgrass Vegetation State

Figure 3. Plant community growth curve (percent production by month).
WY1301, 15-19NP Upland sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	45	35	10	0	5	0	0	0

State 2
Mountain Mahogany/Cheatgrass

Community 2.1
Mountain Mahogany/Cheatgrass

Historically, this plant community evolved under grazing by mule deer and elk. Currently, it is found under heavy winter long browsing by wildlife and heavy spring and summer use by domestic livestock. Mountain mahogany, broom snakeweed and cheatgrass are significant components of this plant community. Annual grasses make up the majority of the understory with the balance made up of perennial cool-season grasses, and miscellaneous forbs. Forbs are common in this plant community, and include western yarrow, field chickweed, hairy goldaster, eriogonums, ballhead sandwort, fringed sagewort and phlox. Plains pricklypear and winterfat can also occur. When compared to the Historical Climax Plant Community, cryptograms and bare ground have increased. Bluebunch wheatgrass, spike fescue and Columbia needlegrass have decreased, often occurring only where protected from grazing by the woody canopy. Production of cool-season grasses has also been reduced. Cheatgrass (downy brome) has invaded the site. Annual production ranges from 500 to 800 pounds The site is at risk for excessive erosion. The biotic integrity of this plant community is usually intact. However, it can be at risk depending on how far a shift has occurred in plant composition toward juniper, sagebrush, and/or cheatgrass. The watershed is usually functioning. However, it can become at risk when canopy cover of juniper, sagebrush, cheatgrass, and/or bare ground increases. Transitions or pathways leading to other plant communities are as follows: • Proper Grazing Management over the long-term will return this state to near Historic Climax Plant Community.

Figure 4. Plant community growth curve (percent production by month).
WY1301, 15-19NP Upland sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	45	35	10	0	5	0	0	0

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1				252–504	
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	151–303	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	101–202	–
2				50–151	
	spike fescue	LEK12	<i>Leucopoa kingii</i>	50–151	–
3				50–151	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–50	–
	threadleaf sedge	CAFI	<i>Carex filifolia</i>	0–50	–
	needle and thread	HECO26	<i>Hesperostipa comata</i>	0–50	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0–50	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	0–50	–
Forb					
4				50–101	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–50	–
	yarrow	ACHIL	<i>Achillea</i>	0–50	–
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	0–50	–
	arrowleaf balsamroot	BASA3	<i>Balsamorhiza sagittata</i>	0–50	–
	bastard toadflax	COUM	<i>Comandra umbellata</i>	0–50	–
	buckwheat	ERIOG	<i>Eriogonum</i>	0–50	–
	hairy false goldenaster	HEVI4	<i>Heterotheca villosa</i>	0–50	–
	Lewis flax	LILE3	<i>Linum lewisii</i>	0–50	–
	dotted blazing star	LIPU	<i>Liatris punctata</i>	0–50	–
Shrub/Vine					
5				202–404	
	mountain mahogany	CERCO	<i>Cercocarpus</i>	202–404	–
6				0–50	
	rubber rabbitbrush	ERNA10	<i>Ericameria nauseosa</i>	0–50	–
7				0–101	
	big sagebrush	ARTR2	<i>Artemisia tridentata</i>	0–101	–
8				0–101	
	skunkbush sumac	RHTR	<i>Rhus trilobata</i>	0–101	–
11				0–50	
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	0–50	–
Tree					
9				0–50	
	Rocky Mountain juniper	JUSC2	<i>Juniperus scopulorum</i>	0–50	–
10				0–50	
	ponderosa pine	PIPO	<i>Pinus ponderosa</i>	0–50	–

Animal community

Animal Community – Wildlife Interpretations

Mountain Mahogany/Bluebunch Wheatgrass Plant Community (HCPC):

The combination of an overstory of mountain mahogany and an understory of grasses and forbs provide a very diverse plant community for wildlife. Due to the location of these sites on the foot slopes of mountains they are valuable for elk and deer winter ranges. Chinook winds often leave these sites clear of snow much of the winter.

Mountain Mahogany/Cheatgrass: The overstory of mountain mahogany provides valuable winter range for deer and elk. Due to the location of these sites on the foot slopes of mountains they are valuable for elk and deer winter ranges. Chinook winds often leave these sites clear of snow much of the winter.

Animal Community – Grazing Interpretations

The following table lists suggested stocking rates for cattle under continuous season-long grazing under normal growing conditions. These are conservative estimates that should be used only as guidelines in the initial stages of the conservation planning process. Often, the current plant composition does not entirely match any particular plant community (as described in this ecological site description). Because of this, a field visit is recommended, in all cases, to document plant composition and production. More precise carrying capacity estimates should eventually be calculated using this information along with animal preference data, particularly when grazers other than cattle are involved. Under more intensive grazing management, improved harvest efficiencies can result in an increased carrying capacity. If distribution problems occur, stocking rates must be reduced to maintain plant health and vigor.

Plant Community Production Carrying Capacity*

(Lb./ac) (AUM/ac)

Mountain Mahogany/Bluebunch Wheatgrass 600-1000 .4

Mountain Mahogany/Cheatgrass 500-800 .2

* - Continuous, season-long grazing by cattle under average growing conditions.

Grazing by domestic livestock is one of the major income-producing industries in the area. Rangeland in this area may provide yearlong forage for cattle, sheep, or horses. During the dormant period, the forage for livestock use needs to be supplemented with protein because the quality does not meet minimum livestock requirements.

Hydrological functions

Water is the principal factor limiting forage production on this site. This site is highly variable and is dominated by soils in hydrologic group B and C, with localized areas in hydrologic group D. Infiltration ranges from slow to very rapid. Runoff potential for this site varies from moderate to high depending on soil hydrologic group, slope and ground cover. Areas where ground cover is less than 50% have the greatest potential to have reduced infiltration and higher runoff (refer to Part 630, NRCS National Engineering Handbook for detailed hydrology information.)

Rills and gullies may be present, but should be small. Water flow patterns should be barely distinguishable. Pedestals are only slightly present in association with bunchgrasses such as bluebunch wheatgrass. Litter typically falls in place, and signs of movement are not common. Chemical and physical crusts are rare to non-existent. Cryptogamic crusts are present, but only cover 1-2% of the soil surface.

Recreational uses

This site provides hunting opportunities for upland game species. The wide variety of plants which bloom from spring until fall have an esthetic value that appeals to visitors.

Wood products

No appreciable wood products are present on the site.

Other products

None noted.

Inventory data references

Inventory Data References (narrative)

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range trained personnel was also used. Other sources used as references include USDA NRCS Water and Climate Center, USDA NRCS National Range and Pasture Handbook, and USDA NRCS Soil Surveys from various counties.

Inventory Data References

Data Source Number of Records Sample Period State County

SCS-RANGE-417 1971-1994 WY

Ocular estimates 1990-1999 WY

Contributors

G. Mitchell

Approval

Kirt Walstad, 4/29/2024

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)	
Contact for lead author	
Date	04/01/2005
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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

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

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is 20-30% occurring in small areas throughout site

5. **Number of gullies and erosion associated with gullies:** Active gullies should not be present
-
6. **Extent of wind scoured, blowouts and/or depositional areas:** None
-
7. **Amount of litter movement (describe size and distance expected to travel):** Little to no plant litter movement. Plant litter remains in place and is not moved by erosional forces.
-
8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Plant cover and litter is at 70% or greater of soil surface and maintains soil surface integrity. Soil Stability class is anticipated to be 5 or greater.
-
9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Use Soil Series description for depth and color of A-horizon
-
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Grass canopy, Shrub Canopy and basal cover should reduce raindrop impact and slow overland flow providing increased time for infiltration to occur. Healthy deep rooted vegetation enhances infiltration and reduces runoff. Infiltration is moderately slow to moderate.
-
11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** No compaction layer or soil surface crusting should be present.
-
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:
- Sub-dominant:
- Other:
- Additional: Shrubs > Mid-stature grasses > Short Grasses/grasslikes = Forbs = Trees
-
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Very Low
-
14. **Average percent litter cover (%) and depth (in):** Average litter cover is 25-35% with depths of 0.25 to 1.0 inches
-
15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-**

production): 900 lbs/ac

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: Sandberg bluegrass, Cheatgrass, Broom snakeweed, Hairy goldaster, Fringed sagewort and Species found on Noxious Weed List
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17. **Perennial plant reproductive capability:** All species are capable of reproducing
-