

Ecological site R043BY350WY

Sandy (Sy)

15-19" Foothills and Mountains East Precipitation Zone

Last updated: 4/30/2024
Accessed: 10/09/2026

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

Associated sites

R043BY308WY	Coarse Upland (CU) 15-19" Foothills and Mountains East Precipitation Zone Coarse Upland
R043BY322WY	Loamy (Ly) 15-19" Foothills and Mountains East Precipitation Zone Loamy
R043BY366WY	Shallow Sandy (SwSy) 15-19" Foothills and Mountains East Precipitation Zone Shallow Sandy

Similar sites

R032XY350WY	Sandy (Sy) 10-14" East Precipitation Zone Sandy 10-14" Foothills and Basins East 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 occurs on nearly level to 30% slopes.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Alluvial fan (3) Ridge
Flooding frequency	None
Ponding frequency	None
Elevation	1,830 – 2,740 m
Slope	0 – 30 %
Ponding depth	0 cm
Aspect	Aspect is not a significant factor

Climatic features

Annual precipitation ranges from 15-19 inches per year. June is generally the wettest month. July, August, and September are somewhat less with daily amounts rarely exceeding one inch.

Snowfall is quite heavy in the area. Annual snowfall averages about 150 inches.

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.

Growth of native cool-season plants begins about May 1 to May 15 and continues to about October 10.

The following information is from the “Crandall Creek” climate station, at the lower end of this precipitation zone:

Minimum Maximum 5 yrs. out of 10 between

Frost-free period (days): 16 80 July 8 – August 20

Freeze-free period (days): 37 120 June 17 – September 5

Mean Annual Precipitation (inches): 10.24 21.23

Mean annual precipitation: 14.90 inches

Mean annual air temperature: 38.16 F (21.88 F Avg. Min. to 54.66 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. There are no other climate station(s) known to be representative of this precipitation zone.

Table 3 Representative climatic features

Frost-free period (average)	80 days
Freeze-free period (average)	120 days
Precipitation total (average)	480 mm

Influencing water features

Stream type: None

Soil features

The soils of this site are deep to moderately deep (greater than 20"to bedrock), well drained and rapidly permeable. The surface soil is at least 3 to 6 "thick (depending on texture and permeability of the subsoil) and will include the following soil textures: fine sandy loam, sandy loam or loamy very fine sand. Coarser topsoils may be included if underlain by finer textured subsoils.

Table 4. Representative soil features

Surface texture	(1) Fine sandy loam (2) Sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained to excessively drained
Permeability class	Moderately rapid to rapid
Soil depth	50 – 150 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	5.08 – 15.49 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 10 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	0 – 10
Soil reaction (1:1 water) (0-101.6cm)	6.6 – 8.4

Subsurface fragment volume <=3" (Depth not specified)	Not specified
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

Ecological Dynamics of the Site:

Potential vegetation on this site is dominated by mid cool-season perennial grasses. Other significant vegetation includes big sagebrush, and a variety of forbs. The expected potential composition for this site is about 70% grasses, 20% forbs and 10% woody plants. The composition and production will vary naturally due to historical use, fluctuating precipitation and fire frequency.

As this site deteriorates species such as bluegrasses, rhizomatous wheatgrasses and big sagebrush will increase. Cool season grasses, such as Columbia needlegrass and mountain brome, will decrease in frequency and production. As conditions continue to deteriorate annuals such as cheatgrass will invade.

Big sagebrush and/or juniper may become dominant on areas with an absence of fire. Wildfires are actively controlled in recent times and as a result old decadent stands of big sagebrush persist. Where junipers naturally occur, this site can become almost entirely covered with juniper. Limber pine may be present on this site but will rarely turn into a dominant species. Chemical and mechanical controls have replaced the historic role of fire on this site. Recently, prescribed burning has regained some popularity.

The big sagebrush component may not be as resilient once it has been removed or severely reduced, if a vigorous stand of grass exists and is maintained. The exception to this is where the herbaceous component is severely degraded at the time of treatment, growing conditions are unfavorable after treatment, and/or recovery of herbaceous species are inadequate.

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.

Plant Community Narratives

Following are the narratives for each of the described plant communities. These plant communities may not represent every possibility, but they probably are the most prevalent and repeatable plant communities. The plant composition tables shown above have been developed from the best available knowledge at the time of this revision. As more data is collected, some of these plant communities may be revised or removed, and new ones may be added. None of these plant communities should necessarily be thought of as "Desired Plant Communities". According to the USDA NRCS National Range and Pasture Handbook, Desired Plant Communities (DPC's) will be determined by the decision-makers and will meet minimum quality criteria established by the NRCS. The main purpose for including any description of a plant community here is to capture the current knowledge and experience at the time of this revision.

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1				530-757	
	Columbia needlegrass	ACNE9	<i>Achnatherum nelsonii</i>	530-757	–
2				76-228	
	mountain brome	BRMA4	<i>Bromus marginatus</i>	76-228	–

3				0-151	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	0-151	–
4				0-151	
	Letterman's needlegrass	ACLE9	<i>Achnatherum lettermanii</i>	0-151	–
5				0-151	
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0-151	–
6				76-228	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0-76	–
	nodding brome	BRAN	<i>Bromus anomalus</i>	0-76	–
	Pumpelly's brome	BRINP5	<i>Bromus inermis ssp. pumpellianus var. pumpellianus</i>	0-76	–
	sedge	CAREX	<i>Carex</i>	0-76	–
	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	0-76	–
	needle and thread	HECO26	<i>Hesperostipa comata</i>	0-76	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	0-76	–
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	0-76	–
Forb					
7				151-303	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0-76	–
	yarrow	ACHIL	<i>Achillea</i>	0-76	–
	textile onion	ALTE	<i>Allium textile</i>	0-76	–
	rosy pussytoes	ANRO2	<i>Antennaria rosea</i>	0-76	–
	Franklin's sandwort	ARFR	<i>Arenaria franklinii</i>	0-76	–
	prairie sagewort	ARFR4	<i>Artemisia frigida</i>	0-76	–
	Missouri milkvetch	ASMI10	<i>Astragalus missouriensis</i>	0-76	–
	Indian paintbrush	CASTI2	<i>Castilleja</i>	0-76	–
	field chickweed	CEAR4	<i>Cerastium arvense</i>	0-76	–
	larkspur	DELPH	<i>Delphinium</i>	0-76	–
	parsnipflower buckwheat	ERHE2	<i>Eriogonum heracleoides</i>	0-76	–
	fleabane	ERIGE2	<i>Erigeron</i>	0-76	–
	aster	EUCEP2	<i>Eucephalus</i>	0-76	–
	lupine	LUPIN	<i>Lupinus</i>	0-76	–
	phlox	PHLOX	<i>Phlox</i>	0-76	–
	deathcamas	ZIGAD	<i>Zigadenus</i>	0-76	–
Shrub/Vine					
8				0-151	
	big sagebrush	ARTR2	<i>Artemisia tridentata</i>	0-151	–
9				0-76	
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	0-76	–
	Rocky Mountain juniper	JUSC2	<i>Juniperus scopulorum</i>	0-76	–
	limber pine	PIFL2	<i>Pinus flexilis</i>	0-76	–

Table 6. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 5.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 10. Community 6.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 11. Community 7.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Animal community

Animal Community – Wildlife Interpretations Columbia Needlegrass/Mountain Brome Plant Community (HCPC): The predominance of grasses in this plant community favors grazers and mixed-feeders, such as deer, bison, elk, and antelope. Suitable thermal and escape cover for deer may be limited due to the low quantities of woody plants. However, topographical variations could provide some escape cover. Due to the location of these sites on the foot slopes of mountains they are valuable for elk and deer winter ranges. When found adjacent to sagebrush dominated states, this plant community may provide brood rearing/foraging areas for sage grouse, as well as lek sites. Other birds that would frequent this plant community include western meadowlark, lark bunting, sage thrasher, horned larks, red-tail and ferruginous hawks, and golden eagles. Many grassland obligate small mammals would occur here. Lettermans Needlegrass/Big Sagebrush Plant Community: The combination of an overstory of big sagebrush and an understory of grasses and forbs provides a very diverse plant community for wildlife. The crowns of sagebrush tend to break up hard crusted snow on winter ranges, so mule deer and antelope may use this state for foraging and cover year-round, as would cottontail and jack rabbits. Due to the location of these sites on the foot slopes of mountains and important shrubs for browsing, these are valuable for elk and deer winter ranges. It provides important winter, nesting, brood-rearing, and foraging habitat for sage grouse. Brewer's sparrows' nest in big sagebrush plants and hosts of other nesting birds utilize stands in the 20-30% cover range. Other birds that would frequent this plant community include western meadowlark, lark bunting, sage thrasher, horned larks, red-tail and ferruginous hawks, and golden eagles. Rhizomatous Wheatgrass/Big Sagebrush Plant Community: The combination of an overstory of big sagebrush and an understory of grasses and forbs provides a very diverse plant community for wildlife. The crowns of sagebrush tend to break up hard crusted snow on winter ranges, so mule deer, elk, and antelope may use this state for foraging and cover year-round, as would cottontail and jack rabbits. It provides important winter, nesting, brood-rearing, and foraging habitat for sage grouse. Brewer's sparrows' nest in big sagebrush plants and hosts of other nesting birds utilize stands in the 20-30% cover range. Other birds that would frequent this plant community include western meadowlark, lark bunting, sage thrasher, horned larks, red-tail and ferruginous hawks, and golden eagles. Mixed Shrub/Bluegrass Plant Community: This plant community can provide important winter foraging for elk, mule deer and antelope, as sagebrush can approach 15% protein and 40-60% digestibility during that time. This community provides escape and thermal cover for large ungulates, as well as nesting and brood rearing habitat for sage grouse. Other birds that would frequent this plant community include western meadowlark, lark bunting, sage thrasher, horned larks, red-tail and ferruginous hawks, and golden eagles. Due to the lack of herbaceous production and diversity of mid cool season grasses on this site, it is not as beneficial to grazers. Juniper/Bare Ground Plant Community: This plant community can provide important winter and escape cover for elk, mule deer and antelope, as the juniper and limber pine can approach 70% cover. However, due to the lack of quality browsing and herbaceous species, this site provides only a minimal source of forage for most wildlife species. Specific bird species such as the nuthatches, western tanager, western kingbird, mountain bluebird, wood-warblers, and northern flicker frequent this site. Rhizomatous Wheatgrass/Lettermans Needlegrass Plant Community: The production of herbaceous species provided for good foraging for grazers. However, the lack of tall or mid growing shrubs does not benefit browsers nor provides cover for many wildlife species. As these site greens-up sooner in the spring, this site tends to provide early new growth for foraging large and small mammals. If located adjacent to shrub dominated sites, It provides good foraging habitat for sage grouse. Cheatgrass/Annual Plant Community: This community provides limited foraging for elk and other grazers. They may be used as a foraging site by chukars if proximal to woody cover. Generally, these are not target plant communities for wildlife habitat management. 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) Columbia Needlegrass/Mountain Brome 1100-1600 .6 Lettermans Needlegrass/Big Sagebrush 900-1400 .5 Rhizomatous WG/Big Sagebrush 700-1200 .4 Mixed Shrub/Bluegrass 600-1000 .3 Juniper/Bare Ground 500-900 .15 Rhizomatous WG/ Lettermans Needlegrass 900-1300 .4 Cheatgrass/Annual 350-650 .15 * - 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 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 dominated by soils in hydrologic group B, with localized areas in hydrologic group C. Infiltration potential for this site varies from moderately rapid to rapid depending on soil hydrologic group and ground cover. Runoff varies from low to moderate. In many cases, areas with greater than 75% ground cover have the greatest potential for high infiltration and lower runoff. An example of an exception would be where; short-grasses form a strong sod and dominate the site. 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 should not typically be present. Water flow patterns should be barely distinguishable if at all present. Pedestals are only slightly present in association with bunchgrasses. 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 varieties of plants that bloom from spring until fall have an esthetic value that appeals to visitors. Other recreational uses may include hiking, camping, mountain biking, and in the winter snowshoeing and cross-country skiing.

Wood products

No appreciable wood products are present on the site.

Other products

None noted.

Inventory data references

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range trained personnel were also used. Those involved in developing this site include: Chris Krassin, Range Management Specialist, James Haverkamp, Range Management Specialist, Steven Gullion, Range Management Specialist, James Mischke, District Conservationist, and Everet Bainter, State Range Management Specialist. 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.

Contributors

R. Gullion

Approval

Kirt Walstad, 4/30/2024

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.

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Date	05/30/2008

Approved by	
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 15-25% 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 75% or greater of soil surface and maintains soil surface integrity. Soil Stability class is anticipated to be 4 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 and basal cover should reduce raindrop impact and slow overland flow providing increased time for infiltration to occur. Healthy deep rooted native grasses enhance infiltration and reduce runoff. Infiltration is Moderately Rapid to

Rapid.

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.
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12. Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):

Dominant: Mid Stature Cool Season Grasses >> Forbs> Shrubs > Short stature Grasses/Grasslike

Sub-dominant:

Other:

Additional:

13. Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence): Very Low
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14. Average percent litter cover (%) and depth (in): Average litter cover is 30-40% with depths of 0.25 to 1.0 inches
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15. Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production): 1350 lbs/ac
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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: Bare ground greater than 30% is the most common indicator of a threshold being crossed. Big sagebrush, rubber rabbitbrush, and bluegrasses are common increasers. Kentucky bluegrass, common dandelion, thistles, and annual weeds such as kochia and mustards are common invasive species in disturbed sites.
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17. Perennial plant reproductive capability: All species are capable of reproducing except in extreme drought years.
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