

Ecological site R043BY222WY
Loamy
Foothills and Mountains West

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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.

Associated sites

R043BY204WY	Clayey Foothills and Mountains West Clayey
R043BY230WY	Overflow Foothills and Mountains West Overflow
R043BY262WY	Shallow Loamy Foothills and Mountains West Shallow Loamy

Similar sites

R034AY222WY	Loamy Foothills and Basins West (Ly) Loamy (Ly) 10-14W has lower production and lacks Idaho fescue, spike fescue, mountain brome, and Columbia needlegrass.
R043BY204WY	Clayey Foothills and Mountains West Clayey (Cy) 15-19W has heavier soil textures and more rhizomatous wheatgrass and less overall diversity.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site occurs on gentle to steep mountain slopes, valley bottoms, and steep glacial moraines. It is found on all exposures at high elevations, but primarily on north and east slopes at lower elevations.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Alluvial fan (3) Ridge
Flooding frequency	None
Ponding frequency	None
Elevation	1,710 – 2,530 m
Slope	0 – 70 %
Ponding depth	0 cm

Climatic features

Annual precipitation ranges from 15-19 inches per year. Wide fluctuations may occur in yearly precipitation and result in more dry years than those with more than normal precipitation. Temperatures show a wide range between summer and winter and between daily maximums and minimums. This is predominantly due to the high elevation and dry air, which permits rapid incoming and outgoing radiation. Cold air outbreaks in winter move rapidly from northwest to southeast and account for extreme minimum temperatures. Extreme storms may occur during the winter, but most severely affect ranch operations during late winter and spring.

Prevailing winds are from the southwest, and strong winds are less frequent than over other areas of Wyoming. Occasional storms, however, can bring brief periods of high winds with gusts exceeding 50 mph.

Growth of native cool season plants begins about May 15 and continues to about August 15.

The following information is from the “Jackson” climate station:

Minimum Maximum 5 yrs. out of 10 between

Frost-free period (days): 12 60 July 9 – August 12

Freeze-free period (days): 42 100 June 20 – August 26

Annual Precipitation (inches): <11.98 >19.69 (2 years in 10)

Mean annual precipitation: 17.00 inches

Mean annual air temperature: 38.9°F (23.3°F Avg. Min. to 54.5°F Avg. Max.)

For detailed information visit the Natural Resources Conservation Service National Water and Climate Center at <http://www.wcc.nrcs.usda.gov/cgibin/state.pl?state=wy> website. Other climate stations representative of this precipitation zone include “Afton” in Lincoln County; and “Darwin Ranch” in Teton County.

Table 3 Representative climatic features

Frost-free period (average)	40 days
Freeze-free period (average)	70 days

Precipitation total (average)	430 mm
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Influencing water features

Soil features

The soils of this site are moderately deep (greater than 20" to bedrock) to very deep and well-drained with textures ranging from very fine sandy loams through clay loams. Some soils have a lime horizon below 3 feet. The overlying soil is usually noncalcareous.

Table 4. Representative soil features

Surface texture	(1) Gravelly loam (2) Clay loam (3) Fine sandy loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Moderately slow to moderate
Soil depth	50 – 150 cm
Surface fragment cover <=3"	0 – 20 %
Surface fragment cover >3"	Not specified
Available water capacity (0-101.6cm)	6.35 – 15.24 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 20 %
Electrical conductivity (0-101.6cm)	0 – 10 mmhos/cm
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)	0 – 10 %
Subsurface fragment volume >3" (Depth not specified)	0 – 10 %

Ecological dynamics

As this site deteriorates because of a combination of frequent and severe grazing, species such as mountain big sagebrush, buckwheat, and yarrow will increase. Less palatable grasses such as Letterman needlegrass, Idaho fescue, rhizomatous wheatgrass, and Sandberg bluegrass also increase. Kentucky bluegrass often invades. Cool-season grasses such as bluebunch wheatgrass, blue wildrye, mountain brome, Columbia needlegrass, and spike fescue will decrease in frequency and production.

Mountain big sagebrush will become dominant with the absence of fire. Wildfires are often actively controlled so chemical control using herbicides has replaced the historic role of fire on this site. Recently, prescribed burning has regained some popularity.

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

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1				224-560	
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	224-560	–
2				224-560	
	Idaho fescue	FEID	<i>Festuca idahoensis</i>	224-560	–
3				112-224	
	blue wildrye	ELGL	<i>Elymus glaucus</i>	112-224	–
4				112-224	
5				112-224	
	mountain brome	BRMA4	<i>Bromus marginatus</i>	112-224	–
6				112-224	
	spike fescue	LEK12	<i>Leucopoa kingii</i>	112-224	–
7				224-560	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0-112	–

	Letterman's needlegrass	ACLE9	<i>Achnatherum lettermanii</i>	0-112	–
	Columbia needlegrass	ACNE9	<i>Achnatherum nelsonii</i>	0-112	–
	western needlegrass	ACOC3	<i>Achnatherum occidentale</i>	0-112	–
	Porter brome	BRPO2	<i>Bromus porteri</i>	0-112	–
	threadleaf sedge	CAFI	<i>Carex filifolia</i>	0-112	–
	sun sedge	CAINH2	<i>Carex inops ssp. heliophila</i>	0-112	–
	California oatgrass	DACA3	<i>Danthonia californica</i>	0-112	–
	timber oatgrass	DAIN	<i>Danthonia intermedia</i>	0-112	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	0-112	–
	thickspike wheatgrass	ELLAL	<i>Elymus lanceolatus ssp. lanceolatus</i>	0-112	–
	slender wheatgrass	ELTR7	<i>Elymus trachycaulus</i>	0-112	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0-112	–
	basin wildrye	LECI4	<i>Leymus cinereus</i>	0-112	–
	oniongrass	MEBU	<i>Melica bulbosa</i>	0-112	–
	green needlegrass	NAVI4	<i>Nassella viridula</i>	0-112	–
	muttongrass	POFE	<i>Poa fendleriana</i>	0-112	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	0-112	–

Forb

8				224-448	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0-112	–
	common yarrow	ACMI2	<i>Achillea millefolium</i>	0-112	–
	giant hyssop	AGAST	<i>Agastache</i>	0-112	–
	agoseris	AGOSE	<i>Agoseris</i>	0-112	–
	rosy pussytoes	ANRO2	<i>Antennaria rosea</i>	0-112	–
	sandwort	ARENA	<i>Arenaria</i>	0-112	–
	milkvetch	ASTRA	<i>Astragalus</i>	0-112	–
	arrowleaf balsamroot	BASA3	<i>Balsamorhiza sagittata</i>	0-112	–
	bellflower	CAMPA	<i>Campanula</i>	0-112	–
	Indian paintbrush	CASTI2	<i>Castilleja</i>	0-112	–
	hawksbeard	CREPI	<i>Crepis</i>	0-112	–
	larkspur	DELPH	<i>Delphinium</i>	0-112	–
	fleabane	ERIGE2	<i>Erigeron</i>	0-112	–
	buckwheat	ERIOG	<i>Eriogonum</i>	0-112	–
	aster	EUCEP2	<i>Eucephalus</i>	0-112	–
	elkweed	FRSP	<i>Frasera speciosa</i>	0-112	–
	woodland strawberry	FRVE	<i>Fragaria vesca</i>	0-112	–
	geranium	GERAN	<i>Geranium</i>	0-112	–
	avens	GEUM	<i>Geum</i>	0-112	–
	gilia	GILIA	<i>Gilia</i>	0-112	–
	American licorice	GLLE3	<i>Glycyrrhiza lepidota</i>	0-112	–
	common sneezeweed	HEAU	<i>Helenium autumnale</i>	0-112	–
	little sunflower	HEPU3	<i>Helianthus pumilus</i>	0-112	–
	pea	LATHY	<i>Lathyrus</i>	0-112	–
	stoneseed	LITHO3	<i>Lithospermum</i>	0-112	–
	lupine	LUPIN	<i>Lupinus</i>	0-112	–
	creeping barberry	MARE11	<i>Mahonia repens</i>	0-112	–

	bluebells	MERTE	<i>Mertensia</i>	0-112	–
	owl's-clover	ORTHO	<i>Orthocarpus</i>	0-112	–
	locoweed	OXYTR	<i>Oxytropis</i>	0-112	–
	ragwort	PACKE	<i>Packera</i>	0-112	–
	beardtongue	PENST	<i>Penstemon</i>	0-112	–
	phacelia	PHACE	<i>Phacelia</i>	0-112	–
	spiny phlox	PHHO	<i>Phlox hoodii</i>	0-112	–
	longleaf phlox	PHLO2	<i>Phlox longifolia</i>	0-112	–
	buttercup	RANUN	<i>Ranunculus</i>	0-112	–
	western coneflower	RUOC2	<i>Rudbeckia occidentalis</i>	0-112	–
	stonecrop	SEDUM	<i>Sedum</i>	0-112	–
	starwort	STELL	<i>Stellaria</i>	0-112	–
	goldenbanner	THERM	<i>Thermopsis</i>	0-112	–
	western meadow-rue	THOC	<i>Thalictrum occidentale</i>	0-112	–
	clover	TRIFO	<i>Trifolium</i>	0-112	–
	American vetch	VIAM	<i>Vicia americana</i>	0-112	–
	violet	VIOLA	<i>Viola</i>	0-112	–
	mule-ears	WYAM	<i>Wyethia amplexicaulis</i>	0-112	–
	meadow deathcamas	ZIVE	<i>Zigadenus venenosus</i>	0-112	–
Shrub/Vine					
9				22-224	
	big sagebrush	ARTR2	<i>Artemisia tridentata</i>	22-224	–
10				0-112	
	Saskatoon serviceberry	AMAL2	<i>Amelanchier alnifolia</i>	0-112	–
	silver sagebrush	ARCA13	<i>Artemisia cana</i>	0-112	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	0-112	–
	quaking aspen	POTR5	<i>Populus tremuloides</i>	0-112	–
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	0-112	–
	elderberry	SAMBU	<i>Sambucus</i>	0-112	–
	western snowberry	SYOC	<i>Symphoricarpos occidentalis</i>	0-112	–

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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Animal community

Animal Community – Wildlife Interpretations Mixed Grass/Mountain Big Sage Plant Community (HCPC): This plant community provides suitable thermal and escape cover for mule deer, elk, and antelope. Sagebrush, which can approach 15% protein and 40-60% digestibility, provides important winter forage for mule deer and elk. Year-round habitat is provided for many sagebrush obligate species such as the sage grouse, sage sparrow, Brewer's sparrow, sage thrasher, pygmy rabbit, sagebrush vole, horned lizard, and pronghorn antelope. Other birds that would frequent this plant community include horned larks and golden eagles. Mountain Big Sage/Bunchgrass Plant Community: This plant community may be useful for the same wildlife that would use the Historic Climax Plant Community. Mountain Big Sage/Idaho Fescue Plant Community: This plant community may be beneficial for the same wildlife that would use the Historic Climax Plant Community. However, the plant community composition is less diverse, and thus, less apt to meet the seasonal

needs of these animals. Kentucky Bluegrass/Idaho Fescue Plant Community: This plant community provides limited forage for elk and mule deer due to low production and lack of sagebrush. 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) Mixed Grass/Big Sage (HCPC) 1400-2400 .6 Mountain Big Sage/Bunchgrass 800-2200 .5 Mountain Big Sage/Idaho Fescue 400-1500 .3 Kentucky Bluegrass/Idaho Fescue 200-800 .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 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 dominated by soils in hydrologic group B, with localized areas in hydrologic groups A and C. Infiltration ranges from rapid to moderate. Runoff potential for this site varies from low to moderate depending on soil hydrologic group and ground cover. In many cases, areas with greater than 75% ground cover have the greatest potential for high infiltration and lower runoff. 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 and shrubs. 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.

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 were also used. Those involved in developing this site include: Bill Christensen, Range Management Specialist, NRCS; Karen Clause, Range Management Specialist, NRCS; and Everett Bainter, Range Management Specialist, NRCS. 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 58 1966-1986 WY Lincoln & others

Contributors

K. Clause

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

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Date	03/16/2007
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. Number and extent of rills: Rare to nonexistent. Where present, short and widely spaced.

2. Presence of water flow patterns: Barely observable.

3. Number and height of erosional pedestals or terracettes: Rare to nonexistent.

4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground): Bare ground can range from 0-20%.

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: Rare to nonexistent.

7. Amount of litter movement (describe size and distance expected to travel): Herbaceous and large woody litter not expected to move.

8. Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values): Soil Stability Index ratings range from 3 (interspaces) to 6 (under plant canopy), but average values should be 4.0 or greater.

9. Soil surface structure and SOM content (include type of structure and A-horizon color and thickness): Soil data is limited for this site. Described A-horizons vary from 6-23 inches (15-58 cm) with OM of 2 to 5%.

10. Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff: Plant community consists of 70-80% grasses, 15% forbs, and 5-15% shrubs. Evenly distributed plant canopy (60-95%) and litter plus moderate infiltration rates result in minimal runoff. Basal cover is typically 5-15% for this site and does affect runoff on this site.

11. Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site): None.

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: Mid-size, cool season bunchgrasses>> perennial shrubs=perennial forbs>tall, cool season bunchgrasses>cool season rhizomatous grasses=short cool season bunchgrasses

13. Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence): Minimal decadence, typically associated with shrub component.

14. Average percent litter cover (%) and depth (in): Litter ranges from 5-40% of total canopy measurement with total litter (including beneath the plant canopy) from 50-90% expected. Herbaceous litter depth typically ranges from 5-15mm. Woody litter can be up to a couple inches (4-6 cm).

15. Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production): English: 1400-2400 lb/ac (2000 lb/ac average); Metric 1568-2688 kg/ha (2240 kg/ha average).

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. Rabbitbrush, Sandberg bluegrass, buckwheat, phlox, and herbaceous cinquefoil are common increasers. Kentucky bluegrass, common dandelion, thistles, and annual weeds such as kochia and mustards are common invasive species in disturbed sites.

17. Perennial plant reproductive capability: All species are capable of reproducing, except in extreme drought years.
