

Ecological site R043BY108WY

Coarse Upland High Mountains

Accessed: 05/15/2024

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

R043BY122WY	<b>Loamy High Mountains</b> Loamy
R043BY130WY	<b>Overflow High Mountains</b> Overflow
R043BY162WY	<b>Shallow Loamy High Mountains</b> Shallow Loamy

Similar sites

R043BY208WY	<b>Coarse Upland Foothills and Mountains West</b> Coarse Upland (CU) 15-19W has lower production.
-------------	--

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

## Physiographic features

This site usually occurs on rolling to rough topography such as glacial moraines, but it may occur on all slopes and positions.

**Table 2. Representative physiographic features**

Landforms	(1) Hill (2) Alluvial fan (3) Ridge
Flooding frequency	None
Ponding frequency	None
Elevation	1,981–3,658 m
Slope	5–65%
Ponding depth	0 cm

## Climatic features

Annual precipitation is fairly evenly distributed through the year and averages over 20 inches. Snows are heavy and usually remain in place during the winter. Annual snowfall averages 150 to 200 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.

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 June 1 at lower elevations, as late as July 15 at higher elevations, and continues until the beginning of September.

The following information is from the “Moran 5 WNW” climate station:

Minimum Maximum 5 yrs. out of 10 between  
Frost-free period (days): 31 78 June 30 – August 24  
Freeze-free period (days): 65 118 June 5 – September 9

Annual Precipitation (inches): <20.78 >29.35 (2 years in 10)

Mean annual precipitation: 25.23 inches

Mean annual air temperature: 36.5°F (22.1°F Avg. Min. to 50.9°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 station representative of this precipitation zone include “Alta 1 NW”, “Lake Yellowstone”, “Moose”, “Old Faithful”, and “Snake River” in Teton County; “Bedford 3 SE” in Lincoln County; and “Bondurant” in Sublette County.

**Table 3. Representative climatic features**

Frost-free period (average)	78 days
Freeze-free period (average)	118 days
Precipitation total (average)	737 mm

## Influencing water features

### Soil features

The soils of this site are deep, well-drained and generally non-calcareous. Surface soils are usually loams or sandy loams. Soils contain a least 35 percent by volume coarse fragments in the first 20 inches. The volume of coarse fragments generally increases with depth. These stony, and/or bouldery soils occur as terraces, fan terraces, or glacial moraines.

Major Soil Series correlated to this site includes:

**Table 4. Representative soil features**

Surface texture	(1) Very stony sandy loam (2) Cobbly fine sandy loam (3) Very cobbly loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate
Soil depth	51–152 cm
Surface fragment cover <=3"	0–30%
Surface fragment cover >3"	25–60%
Available water capacity (0-101.6cm)	5.08–11.43 cm
Calcium carbonate equivalent (0-101.6cm)	0–5%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	5.6–7.2
Subsurface fragment volume <=3" (Depth not specified)	10–40%
Subsurface fragment volume >3" (Depth not specified)	20–50%

### Ecological dynamics

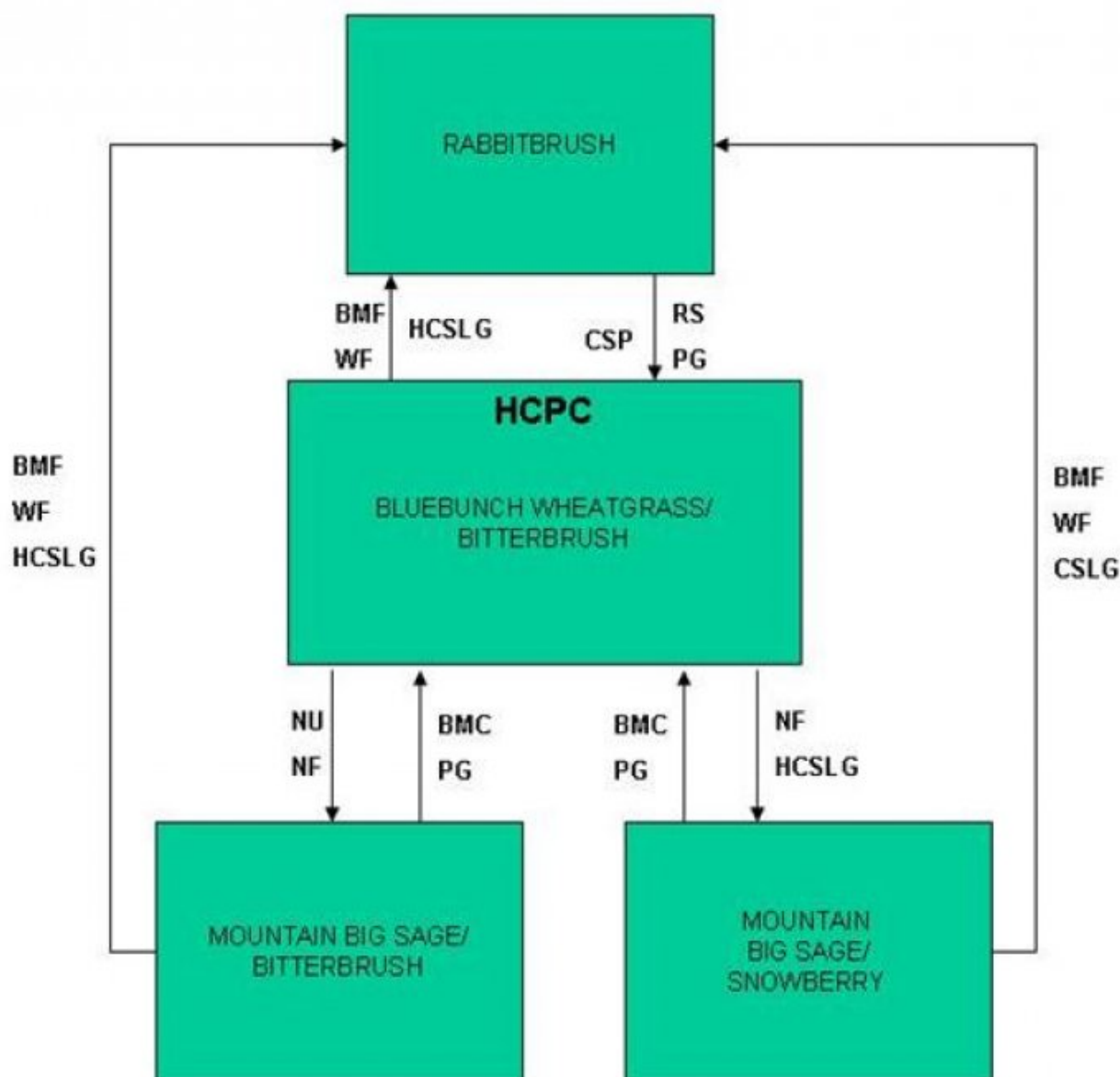
As this site deteriorates because of a combination of frequent and severe grazing, species such as rhizomatous wheatgrass, mountain big sagebrush, and snowberry will increase. Cool-season grasses such as bluebunch wheatgrass, Columbia needlegrass, spike fescue, and woody plants such as bitterbrush will decrease in frequency and production.

Mountain big sagebrush will become dominant with the absence of fire. Juniper and limber pine will often encroach on higher elevation slopes and ridges. 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



BMA – Brush Management (all methods)  
BMC – Brush Management (chemical)  
BMF – Brush Management (fire)  
BMM – Brush Management (mechanical)  
CSP – Chemical Seedbed Preparation  
CSLG – Continuous Season-long Grazing  
DR – Drainage  
CSG – Continuous Spring Grazing  
HB – Heavy Browse  
HCSLG – Heavy Continuous Season-long Grazing  
HI – Heavy Inundation  
LPG – Long-term Prescribed Grazing  
MT – Mechanical Treatment (chiseling, ripping, pitting)

NF – No Fire  
NS – Natural Succession  
NWC – Noxious Weed Control  
NWI – Noxious Weed Invasion  
NU – Nonuse  
P&C – Plow & Crop (including hay)  
PG – Prescribed Grazing  
RPT – Re-plant Trees  
RS – Re-seed  
SGD – Severe Ground Disturbance  
SHC – Severe Hoof Compaction  
WD – Wildlife Damage (Beaver)  
WF – Wildfire

State 1  
Bluebunch Wheatgrass/Bitterbrush Plant Community (HCPC)

Community 1.1  
Bluebunch Wheatgrass/Bitterbrush Plant Community (HCPC)

The interpretive plant community for this site is the Historic Climax Plant Community. This state evolved with grazing by large herbivores and is well suited for grazing by domestic livestock. Potential vegetation is estimated at 60% grasses or grass-like plants, 15% forbs, and 25% woody plants. The major grasses include bluebunch wheatgrass, spike fescue, Idaho fescue, and big bluegrass. Other grasses may include one-spike and timber oatgrass, oniongrass, spike trisetum, Columbia, western, and Letterman needlegrass, mountain and nodding brome, slender and thickspike wheatgrass, Canby bluegrass, bentgrasses, alpine timothy, basin wildrye, prairie junegrass, and mountain muhly. Bitterbrush and mountain big sagebrush are the dominant woody plants. Other woody species may include rubber rabbitbrush, black sagebrush, snowberry, and serviceberry. A typical plant composition for this state consists of bluebunch wheatgrass 25-35%, spike fescue 10-15%, Idaho fescue 10-15%, big bluegrass 5-10%, other grasses and grass-like plants 10-20%, perennial forbs 5-15%, bitterbrush 10-20%, mountain big sagebrush 5-10%, and up to 10% other woody species. The overstory of sagebrush and understory of grass and forbs provide a diverse plant community that will support domestic livestock and wildlife such as mule deer and antelope. Ground cover, by ocular estimate, varies from 45-55% and canopy cover of shrubs ranges from 15-25%. The total annual production (air-dry weight) of this state is about 2000 lbs./acre, but it can range from about 1200 lbs./acre in unfavorable years to about 2400 lbs./acre in above average years. The following is the growth curve of this plant community expected during a normal year: Growth curve number: WY0101 Growth curve name: 20+M, UPLAND SITES Growth curve description: ALL UPLAND SITES JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC 0 0 0 0 5 30 40 20 5 0 0 0 (Monthly percentages of total annual growth) This plant community is extremely stable and well adapted to the Central Rocky Mountains 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: • Nonuse and No Fire will convert this plant community to the Mountain Big Sage/Bitterbrush State. • Heavy Continuous Season-long Grazing with No Fire will convert this plant community to the Mountain Big Sage/Snowberry State. • Wildfire or Prescribed Fire with Heavy Continuous Season-long Grazing will convert this plant community to the Rabbitbrush State.

Figure 4. Plant community growth curve (percent production by month).  
WY0101, 20+ upland sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
				5	30	40	20	5			

State 2  
Mountain Big Sage/Bitterbrush Plant Community

Community 2.1  
Mountain Big Sage/Bitterbrush Plant Community

This plant community is a result of nonuse and lack of fire. Woody plants such as big sagebrush and bitterbrush are dominant, making up 50 to 75% of the annual production. Rocky Mountain juniper and limber pine often encroach on higher elevation ridges and on north facing slopes. Woody plants may become decadent and of lower nutritive value for wildlife and livestock. Major grasses in the understory include bluebunch wheatgrass, Idaho fescue, Columbia needlegrass, and spike fescue. The total annual production (air-dry weight) of this state is about 1800 pounds per acre, but it can range from about 1000 lbs./acre in unfavorable years to about 2200 lbs./acre in above average years. The following is the growth curve of this plant community expected during a normal year: Growth curve number: WY0101 Growth curve name: 20+M, UPLAND SITES Growth curve description: ALL UPLAND SITES JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC 0 0 0 0 5 30 40 20 5 0 0 0 (Monthly percentages of total annual growth) The state is stable and protected from excessive erosion. The biotic integrity of this plant community is usually intact, however forage value will decrease and wildlife values will shift toward different species. The watershed is functioning. Transitions or pathways leading to other plant communities are as follows: • Chemical Brush Management followed by deferment for 1 to 2 years as part of a Prescribed Grazing plan

will result in a plant community very similar to the Historic Climax Plant Community (Bluebunch Wheatgrass/Bitterbrush State). Care should be taken when planning brush management to consider wildlife and critical winter ranges. • Wildfire or Prescribed Fire followed by Heavy Continuous Season-long Grazing will convert this plant community to the Rabbitbrush State.

Figure 5. Plant community growth curve (percent production by month).  
WY0101, 20+ upland sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
				5	30	40	20	5			

## State 3 Mountain Big Sage/Snowberry Plant Community

### Community 3.1 Mountain Big Sage/Snowberry Plant Community

This plant community is the result of heavy continuous season-long grazing with long-term protection from fire. Sagebrush and snowberry eventually dominate this plant community with annual production often exceeding 40%. Rocky Mountain juniper and limber pine often encroach on higher elevation ridges and on north facing slopes. Bitterbrush, although present, will be severely suppressed by sagebrush overstory and heavy browsing. Dominant grasses include rhizomatous wheatgrass, Canby and Sandberg bluegrass, and Letterman needlegrass. The total annual production (air-dry weight) of this state is about 1200 pounds per acre, but it can range from about 800 lbs./acre in unfavorable years to about 1800 lbs./acre in above average years. The following is the growth curve of this plant community expected during a normal year: Growth curve number: WY0101 Growth curve name: 20+M, UPLAND SITES Growth curve description: ALL UPLAND SITES JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC 0 0 0 0 5 30 40 20 5 0 0 0 (Monthly percentages of total annual growth) Soil erosion is increased because of increased bare ground in the understory. The biotic community has been compromised, but is relatively stable. The watershed is functioning, but is at risk of further degradation. Water flow patterns and pedestals are obvious. Infiltration is reduced and runoff is increased. Transitions or pathways leading to other plant communities are as follows: • Chemical Brush Management followed by deferment for 1 to 2 years as part of a Prescribed Grazing plan will result in a plant community very similar to the Historic Climax Plant Community (Bluebunch Wheatgrass/Bitterbrush State). Care should be taken when planning brush management to consider wildlife and critical winter ranges. • Wildfire or Prescribed Fire followed by Continuous Season-long Grazing will convert this plant community to the Rabbitbrush State.

Figure 6. Plant community growth curve (percent production by month).  
WY0101, 20+ upland sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
				5	30	40	20	5			

## State 4 Rabbitbrush Plant Community

### Community 4.1 Rabbitbrush Plant Community

This plant community is a result of wildfire or a hot prescribed fire in conjunction with unmanaged grazing practices. Bunchgrasses such as basin wildrye, bluebunch wheatgrass, Columbia needlegrass, spike fescue, and big bluegrass decrease from grazing pressure. The response of bitterbrush to fire can be quite varied, depending on the intensity of the fire. Sprouting shrubs such as rabbitbrush and spiked big sage invade these sites. The total annual production (air-dry weight) of this state is about 800 pounds per acre, but it can range from about 500 lbs./acre in unfavorable years to about 1200 lbs./acre in above average years. The following is the growth curve of this plant community expected during a normal year: Growth curve number: WY0101 Growth curve name: 20+M, UPLAND SITES Growth curve description: ALL UPLAND SITES JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC 0 0 0 0 5 30 40 20 5 0 0 0 (Monthly percentages of total annual growth) The state is vulnerable to excessive erosion. The biotic integrity of this plant community is at risk depending on how far a shift has occurred in plant

composition toward rabbitbrush and annual forbs. The watershed is at risk as bare ground increases. Transitions or pathways leading to other plant communities are as follows: • Chemical Seedbed Preparation and Re-seeding followed by deferment for 1 to 2 years as part of a Prescribed Grazing plan will result in a plant community very similar to the Historic Climax Plant Community (Bunchgrass/Bitterbrush State). Additional deferment may be necessary and should be prescribed on an individual site basis.

**Figure 7. Plant community growth curve (percent production by month).**  
WY0101, 20+ upland sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
				5	30	40	20	5			

## Additional community tables

**Table 5. Community 1.1 plant community composition**

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1				560–785	
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	560–785	–
2				224–336	
	Idaho fescue	FEID	<i>Festuca idahoensis</i>	224–336	–
3				224–336	
	spike fescue	LEKI2	<i>Leucopoa kingii</i>	224–336	–
4				112–224	
5				224–448	
	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	–
	bentgrass	AGROS2	<i>Agrostis</i>	0–112	–
	mountain brome	BRMA4	<i>Bromus marginatus</i>	0–112	–
	Porter brome	BRPO2	<i>Bromus porteri</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	–
	onespike danthonia	DAUN	<i>Danthonia unispicata</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	–
	mountain muhly	MUMO	<i>Muhlenbergia montana</i>	0–112	–
	alpine timothy	PHAL2	<i>Phleum alpinum</i>	0–112	–
	spike trisetum	TRSP2	<i>Trisetum spicatum</i>	0–112	–
<b>Forb</b>					
6				112–336	



	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	–
	pussytoes	ANTEN	<i>Antennaria</i>	0–112	–
	sandwort	ARENA	<i>Arenaria</i>	0–112	–
	milkvetch	ASTRA	<i>Astragalus</i>	0–112	–
	balsamroot	BALSA	<i>Balsamorhiza</i>	0–112	–
	Indian paintbrush	CASTI2	<i>Castilleja</i>	0–112	–
	pale bastard toadflax	COUMP	<i>Comandra umbellata ssp. pallida</i>	0–112	–
	hawksbeard	CREPI	<i>Crepis</i>	0–112	–
	cryptantha	CRYPT	<i>Cryptantha</i>	0–112	–
	draba	DRABA	<i>Draba</i>	0–112	–
	fleabane	ERIGE2	<i>Erigeron</i>	0–112	–
	buckwheat	ERIOG	<i>Eriogonum</i>	0–112	–
	aster	EUCEP2	<i>Eucephalus</i>	0–112	–
	avens	GEUM	<i>Geum</i>	0–112	–
	sunflower	HELIA3	<i>Helianthus</i>	0–112	–
	pea	LATHY	<i>Lathyrus</i>	0–112	–
	desertparsley	LOMAT	<i>Lomatium</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	–
	ragwort	PACKE	<i>Packera</i>	0–112	–
	beardtongue	PENST	<i>Penstemon</i>	0–112	–
	phacelia	PHACE	<i>Phacelia</i>	0–112	–
	phlox	PHLOX	<i>Phlox</i>	0–112	–
	American bistort	POBI6	<i>Polygonum bistortoides</i>	0–112	–
	primrose	PRIMU	<i>Primula</i>	0–112	–
	buttercup	RANUN	<i>Ranunculus</i>	0–112	–
	stonecrop	SEDUM	<i>Sedum</i>	0–112	–
	goldenrod	SOLID	<i>Solidago</i>	0–112	–
	clover	TRIFO	<i>Trifolium</i>	0–112	–
	American vetch	VIAM	<i>Vicia americana</i>	0–112	–
	mule-ears	WYAM	<i>Wyethia amplexicaulis</i>	0–112	–

#### Shrub/Vine

7				224–448	
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	224–448	–
8				112–224	
	mountain big sagebrush	ARTRV	<i>Artemisia tridentata ssp. vaseyana</i>	112–224	–
9				0–224	
	Shrub, deciduous	2SD	<i>Shrub, deciduous</i>	0–112	–
	Shrub, evergreen	2SE	<i>Shrub, evergreen</i>	0–112	–

	Tree, deciduous	2TD	<i>Tree, deciduous</i>	0–112	–
	Tree, evergreen	2TE	<i>Tree, evergreen</i>	0–112	–
	Saskatoon serviceberry	AMAL2	<i>Amelanchier alnifolia</i>	0–112	–
	tarragon	ARDR4	<i>Artemisia dracunculus</i>	0–112	–
	white sagebrush	ARLU	<i>Artemisia ludoviciana</i>	0–112	–
	black sagebrush	ARNO4	<i>Artemisia nova</i>	0–112	–
	rubber rabbitbrush	ERNA10	<i>Ericameria nauseosa</i>	0–112	–
	snowberry	SYMPH	<i>Symphoricarpos</i>	0–112	–

## Animal community

### Animal Community – Wildlife Interpretations

Bluebunch Wheatgrass/Bitterbrush Plant Community (HCPC): This plant community provides suitable thermal and escape cover for mule deer, elk, and antelope. Bitterbrush and sagebrush provide important winter forage for mule deer and elk. Birds that would frequent this plant community include horned larks and golden eagles.

Mountain Big Sage/Bitterbrush 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.

Mountain Big Sage/Snowberry 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. Bitterbrush suppression affects the quality and quantity of winter forage for mule deer and elk.

Rabbitbrush Plant Community: This plant community provides spring forage and limited cover for elk and mule deer due to lack of palatable woody species.

### 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)

Bluebunch Wheatgrass/Bitterbrush 1200-2400 0.6

Mountain Big Sage/Bitterbrush 1000-2200 0.5

Mountain Big Sage/Snowberry 800-1800 0.3

Rabbitbrush 500-1200 0.2

\* - 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 dominated by soils in hydrologic group A and B. 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. 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. The varied topography and large boulders appeal to hikers and mountain bikers.

## 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 Everet 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

## 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.

Author(s)/participant(s)	K. Clause, E. Bainter
Contact for lead author	karen.clause@wy.usda.gov or 307-367-2257
Date	03/16/2007
Approved by	E. Bainter
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 0-15%.

---
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. Soil OM of 6-16% is expected.

---
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Plant community consists of 45-65% grasses, 15% forbs, and 20-40% shrubs. Evenly distributed plant canopy (60-95%) and litter plus moderate infiltration rates result in minimal runoff. Basal cover is typically greater than 10% for this site and does affect runoff on this site. Surface rock fragments of 5-20% provide stability to the site, but reduce infiltration.

---
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: 1200-2400 lb/ac (2000 lb/ac average); Metric 1344-2688 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 25% is the most common indicator of a threshold being crossed. Rabbitbrush, Sandberg bluegrass, buckwheat, phlox, and yarrow are common increasers. Kentucky bluegrass, common dandelion, thistles, and annual weeds such as cheatgrass 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.
-