USDA Natural Resources Conservation Service

Ecological site R043BY208WY
Coarse Upland Foothills and Mountains West

Accessed: 05/11/2025

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.

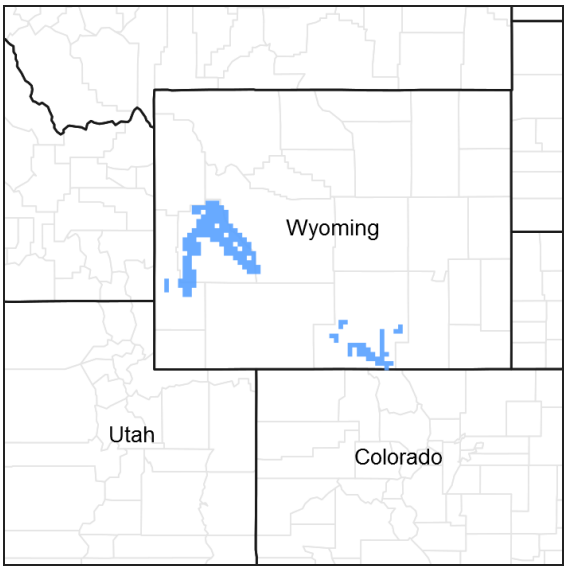


Figure 1. Mapped extent

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

R043BY204WY	**Clayey Foothills and Mountains West** Clayey
R043BY222WY	**Loamy Foothills and Mountains West** Loamy
R043BY230WY	**Overflow Foothills and Mountains West** Overflow
R043BY262WY	**Shallow Loamy Foothills and Mountains West** Shallow Loamy

Similar sites

R034AY208WY	**Coarse Upland Foothills and Basins West (CU)** Coarse Upland (CU), 10-14W has lower production.

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 rolling to rough topography, 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	5,600–8,300 ft
Slope	25–65%
Ponding depth	0 in

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)	60 days
Freeze-free period (average)	100 days
Precipitation total (average)	19 in

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 at 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.

Table 4. Representative soil features

Surface texture	(1) Very stony sandy loam (2) Very gravelly fine sandy loam (3) Extremely bouldery loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate to moderately rapid
Soil depth	20–60 in
Surface fragment cover <=3"	0–30%
Surface fragment cover >3"	25–60%
Available water capacity (0-40in)	2–4.5 in
Calcium carbonate equivalent (0-40in)	0–5%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	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 Idaho fescue, mountain big sagebrush and snowberry will increase. Cheatgrass often invades with ground disturbance and fire, especially on south and west facing slopes. Cool-season grasses such as bluebunch wheatgrass, Columbia needlegrass, spike fescue, and woody plants such as bitterbrush will decrease in frequency and production.

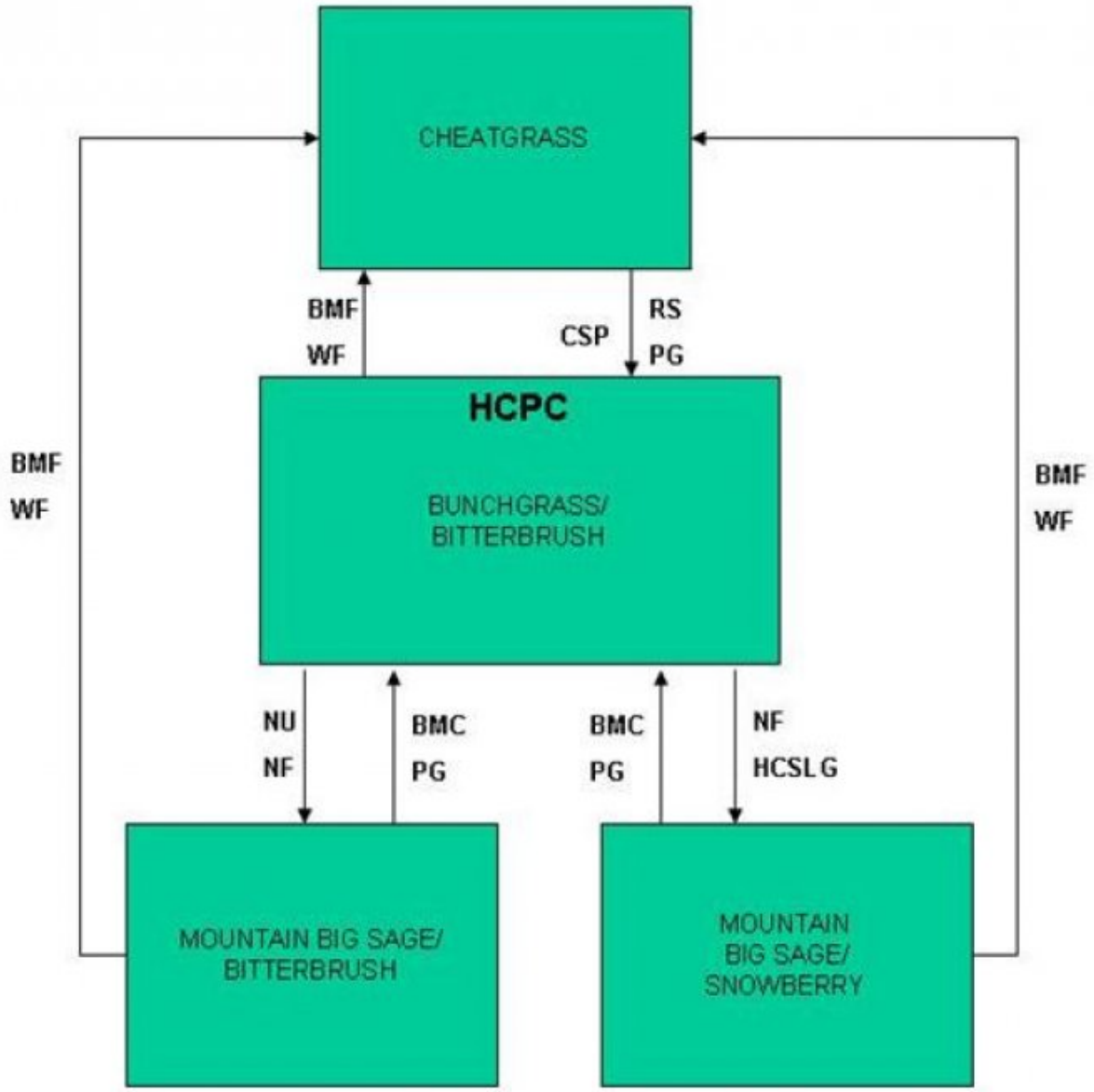
Mountain big sagebrush will become dominant with the absence of fire. Juniper and limber pine will often encroach on higher elevation slopes and ridges. Wildfires are often actively controlled so chemical control using herbicides has replaced the historic role of fire on this site. Recently, prescribed 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
Bunchgrass/Bitterbrush Plant Community (HCPC)

Community 1.1
Bunchgrass/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, and Idaho fescue. Other grasses may include California and timber oatgrass, oniongrass, spike trisetum, Columbia and Letterman needlegrass, mountain and nodding brome, slender and thickspike wheatgrass, Sandberg, Canby, and mutton bluegrass, 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 10-35%, spike fescue 10-20%, Idaho fescue 5-10%, other grasses and grass-like plants 10-20%, perennial forbs 5-15%, bitterbrush 10-20%, mountain big sagebrush 1-10%, and up to 5% 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 30-45%. The total annual production (air-dry weight) of this state is about 1600 lbs./acre, but it can range from about 1100 lbs./acre in unfavorable years to about 2000 lbs./acre in above average years. The following is the growth curve of this plant community expected during a normal year: Growth curve number: WY0201 Growth curve name: 15-19W, UPLAND SITES Growth curve description: ALL UPLAND SITES JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC 0 0 0 0 10 35 30 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 (on predominantly south and west facing slopes) may convert this plant community to the Cheatgrass State.

Figure 3. Plant community growth curve (percent production by month). WY0201, 15-19W Upland sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
				10	35	30	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, Columbia needlegrass, and spike fescue. The total annual production (air-dry weight) of this state is about 1200 pounds per acre, but it can range from about 900 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: WY0201 Growth curve name: 15-19W, UPLAND SITES Growth curve description: ALL UPLAND SITES JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC 0 0 0 0 10 35 30 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 (Bunchgrass/Bitterbrush State). Care should be

taken when planning brush management to consider wildlife and critical winter ranges. • Wildfire or Prescribed Fire (on predominantly south and west facing slopes) may convert this plant community to the Cheatgrass State.

Figure 4. Plant community growth curve (percent production by month). WY0201, 15-19W Upland sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
				10	35	30	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 60%. 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 700 pounds per acre, but it can range from about 500 lbs./acre in unfavorable years to about 1400 lbs./acre in above average years. The following is the growth curve of this plant community expected during a normal year: Growth curve number: WY0201 Growth curve name: 15-19W, UPLAND SITES Growth curve description: ALL UPLAND SITES JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC 0 0 0 0 10 35 30 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 (Bunchgrass/Bitterbrush State). Care should be taken when planning brush management to consider wildlife and critical winter ranges. • Wildfire or Prescribed Fire (on predominantly south and west facing slopes) may convert this plant community to the Cheatgrass State.

Figure 5. Plant community growth curve (percent production by month). WY0201, 15-19W Upland sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
				10	35	30	20	5			

State 4
Cheatgrass Plant Community

Community 4.1
Cheatgrass Plant Community

This plant community is a result of wildfire or a hot prescribed fire on predominantly south and west facing slopes. Bunchgrasses such as basin wildrye, bluebunch wheatgrass, Columbia needlegrass, spike fescue, and big bluegrass respond well as long as deferment follows the fire. The response of bitterbrush to fire can be quite varied, depending on the intensity of the fire. Cheatgrass often invades these sites, particularly on south and west facing slopes, effectively decreasing the fire interval (fewer years between fire events) of the site, and preventing mature shrub establishment. The total annual production (air-dry weight) of this state is about 600 pounds per acre, but it can range from about 300 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: WY0201 Growth curve name: 15-19W, UPLAND SITES Growth curve description: ALL UPLAND SITES JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC 0 0 0 0 10 35 30 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 green rabbitbrush, cheatgrass, 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) although cheatgrass may remain a part of the plant community. Additional deferment may be necessary and should be prescribed on an individual site basis.

Figure 6. Plant community growth curve (percent production by month). WY0201, 15-19W Upland sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
				10	35	30	20	5			

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1				160–560	
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	160–560	–
2				80–160	
	Idaho fescue	FEID	*Festuca idahoensis*	80–160	–
3				160–320	
	spike fescue	LEKI2	*Leucopoa kingii*	160–320	–
4				160–320	
	Grass, perennial	2GP	*Grass, perennial*	0–80	–
	Letterman's needlegrass	ACLE9	*Achnatherum lettermanii*	0–80	–
	Columbia needlegrass	ACNE9	*Achnatherum nelsonii*	0–80	–
	mountain brome	BRMA4	*Bromus marginatus*	0–80	–
	Porter brome	BRPO2	*Bromus porteri*	0–80	–
	California oatgrass	DACA3	*Danthonia californica*	0–80	–
	timber oatgrass	DAIN	*Danthonia intermedia*	0–80	–
	onespike danthonia	DAUN	*Danthonia unispicata*	0–80	–
	squirreltail	ELEL5	*Elymus elymoides*	0–80	–
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	0–80	–
	slender wheatgrass	ELTR7	*Elymus trachycaulus*	0–80	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–80	–
	basin wildrye	LECI4	*Leymus cinereus*	0–80	–
	oniongrass	MEBU	*Melica bulbosa*	0–80	–
	mountain muhly	MUMO	*Muhlenbergia montana*	0–80	–
	green needlegrass	NAVI4	*Nassella viridula*	0–80	–
	muttongrass	POFE	*Poa fendleriana*	0–80	–
	Sandberg bluegrass	POSE	*Poa secunda*	0–80	–
	spike trisetum	TRSP2	*Trisetum spicatum*	0–80	–
Forb					
5				80–240	
	Forb, perennial	2FP	*Forb, perennial*	0–80	–

	common yarrow	ACMI2	*Achillea millefolium*	0–80	–
	agoseris	AGOSE	*Agoseris*	0–80	–
	pussytoes	ANTEN	*Antennaria*	0–80	–
	sandwort	ARENA	*Arenaria*	0–80	–
	milkvetch	ASTRA	*Astragalus*	0–80	–
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	0–80	–
	pond water-starwort	CAST	*Callitriche stagnalis*	0–80	–
	alpine dustymaiden	CHDOA2	*Chaenactis douglasii var. alpina*	0–80	–
	thistle	CIRSI	*Cirsium*	0–80	–
	pale bastard toadflax	COUMP	*Comandra umbellata ssp. pallida*	0–80	–
	hawksbeard	CREPI	*Crepis*	0–80	–
	cryptantha	CRYPT	*Cryptantha*	0–80	–
	larkspur	DELPH	*Delphinium*	0–80	–
	draba	DRABA	*Draba*	0–80	–
	fleabane	ERIGE2	*Erigeron*	0–80	–
	buckwheat	ERIOG	*Eriogonum*	0–80	–
	aster	EUCEP2	*Eucephalus*	0–80	–
	geranium	GERAN	*Geranium*	0–80	–
	little sunflower	HEPU3	*Helianthus pumilus*	0–80	–
	false goldenaster	HETER8	*Heterotheca*	0–80	–
	lupine	LUPIN	*Lupinus*	0–80	–
	creeping barberry	MARE11	*Mahonia repens*	0–80	–
	bluebells	MERTE	*Mertensia*	0–80	–
	locoweed	OXYTR	*Oxytropis*	0–80	–
	ragwort	PACKE	*Packera*	0–80	–
	beardtongue	PENST	*Penstemon*	0–80	–
	phacelia	PHACE	*Phacelia*	0–80	–
	spiny phlox	PHHO	*Phlox hoodii*	0–80	–
	longleaf phlox	PHLO2	*Phlox longifolia*	0–80	–
	primrose	PRIMU	*Primula*	0–80	–
	buttercup	RANUN	*Ranunculus*	0–80	–
	stonecrop	SEDUM	*Sedum*	0–80	–
	goldenrod	SOLID	*Solidago*	0–80	–
	Townsend daisy	TOWNS	*Townsendia*	0–80	–
	clover	TRIFO	*Trifolium*	0–80	–
	American vetch	VIAM	*Vicia americana*	0–80	–
	mule-ears	WYAM	*Wyethia amplexicaulis*	0–80	–
Shrub/Vine					
6				160–320	
	antelope bitterbrush	PUTR2	*Purshia tridentata*	160–320	–
	antelope bitterbrush	PUTR2	*Purshia tridentata*	160–320	–
7				16–160	
	big sagebrush	ARTR2	*Artemisia tridentata*	16–160	–

8				0–80	
	Saskatoon serviceberry	AMAL2	*Amelanchier alnifolia*	0–80	–
	black sagebrush	ARNO4	*Artemisia nova*	0–80	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	0–80	–
	western snowberry	SYOC	*Symphoricarpos occidentalis*	0–80	–

Animal community

Animal Community – Wildlife Interpretations
Bunchgrass/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, antelope, and elk. Year-round habitat is provided for many sagebrush obligate species such as the 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/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.

Cheatgrass Plant Community: This plant community provides spring forage and limited cover for elk and mule deer due to lack of 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)
Bunchgrass/Bitterbrush 1100-2000 .5
Mountain Big Sage/Bitterbrush 900-1800 .4
Mountain Big Sage/Snowberry 500-1400 .22
Cheatgrass 300-1200 .12

* - 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
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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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.

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

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

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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%.

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5. **Number of gullies and erosion associated with gullies:** Active gullies should not be present.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** Rare to nonexistent.

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

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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.

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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 2 to 5% is expected.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Plant community consists of 50-80% grasses, 15% forbs, and 5-35% 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. Surface rock fragments of 5-20% provide stability to the site, but reduce infiltration.

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

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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:

    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

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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.

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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).

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** English: 1100-2000 lb/ac (1600 lb/ac average); Metric 1232-2240 kg/ha (1792 kg/ha average).

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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. Rabbitbrush, Sandberg bluegrass, buckwheat, phlox, and herbaceous cinquefoil are common increasers. Kentucky bluegrass, common dandelion, thistles, and annual weeds such as cheatgrass 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.
