

# Ecological site R034AY234WY Rocky Hills Foothills and Basins West (RH)

Accessed: 04/28/2024

## 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.

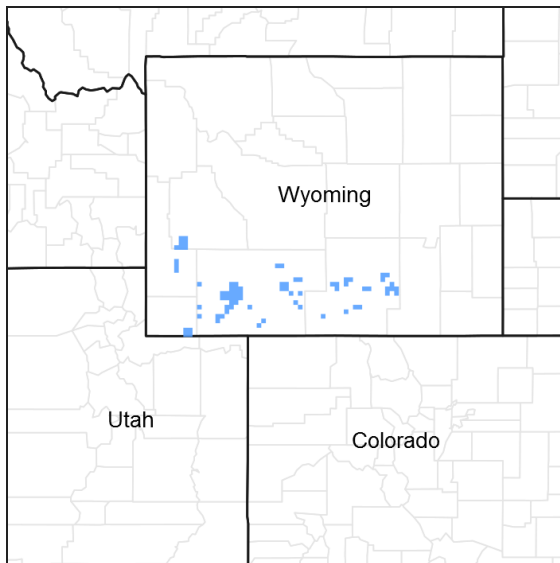


Figure 1. Mapped extent

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

R034AY222WY	<b>Loamy Foothills and Basins West (Ly)</b> Loamy
R034AY258WY	<b>Shallow Clayey Foothills and Basins West (SwCy)</b> Shallow Clayey
R034AY262WY	<b>Shallow Loamy Foothills and Basins West (SwLy)</b> Shallow Loamy

## Similar sites

R034AY276WY	<b>Very Shallow Foothills and Basins West (VS)</b> Very Shallow (VS) 10-14W has lower production and does not have mountain mahogany as a major woody component.
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Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

## Physiographic features

This site usually occurs on upland positions but may occur on all slopes and positions.

**Table 2. Representative physiographic features**

Landforms	(1) Ridge (2) Escarpment (3) Hill
Flooding frequency	None
Ponding frequency	None
Elevation	1,981–2,286 m
Slope	1–70%
Ponding depth	0 cm
Aspect	Aspect is not a significant factor

## Climatic features

Annual precipitation ranges from 10-14 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.

Daytime winds are generally stronger than nighttime and occasional strong storms may bring brief periods of high winds with gusts to more than 50 mph.

Growth of native cool season plants begins about April 15 and continues to about August 15. Some green up of cool season plants usually occurs in September depending upon fall moisture occurrences.

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 "Border 3 N" and Kemmerer Wtr Trtmt" in Lincoln County; "Evanston 1 E" in Uinta County; and "Merna" in Sublette County.

**Table 3. Representative climatic features**

Frost-free period (average)	67 days
Freeze-free period (average)	97 days
Precipitation total (average)	356 mm

## Influencing water features

There are no water features associated with this site.

## Soil features

The soils of this site are shallow to very deep and well drained. They formed by alluvium, colluvium and residuum on calcareous sandstone and shale and have moderate permeability. Soil texture modifiers can be cobbly, very channery, and extremely channery.

**Table 4. Representative soil features**

Surface texture	(1) Loam (2) Clay loam (3) Very channery loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate to moderately rapid
Soil depth	51–152 cm
Surface fragment cover ≤3"	10–40%
Surface fragment cover >3"	10–40%
Available water capacity (0-101.6cm)	1.78–2.54 cm
Calcium carbonate equivalent (0-101.6cm)	0–35%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–3
Soil reaction (1:1 water) (0-101.6cm)	6.6–8.4
Subsurface fragment volume ≤3" (Depth not specified)	10–60%
Subsurface fragment volume >3" (Depth not specified)	10–60%

## Ecological dynamics

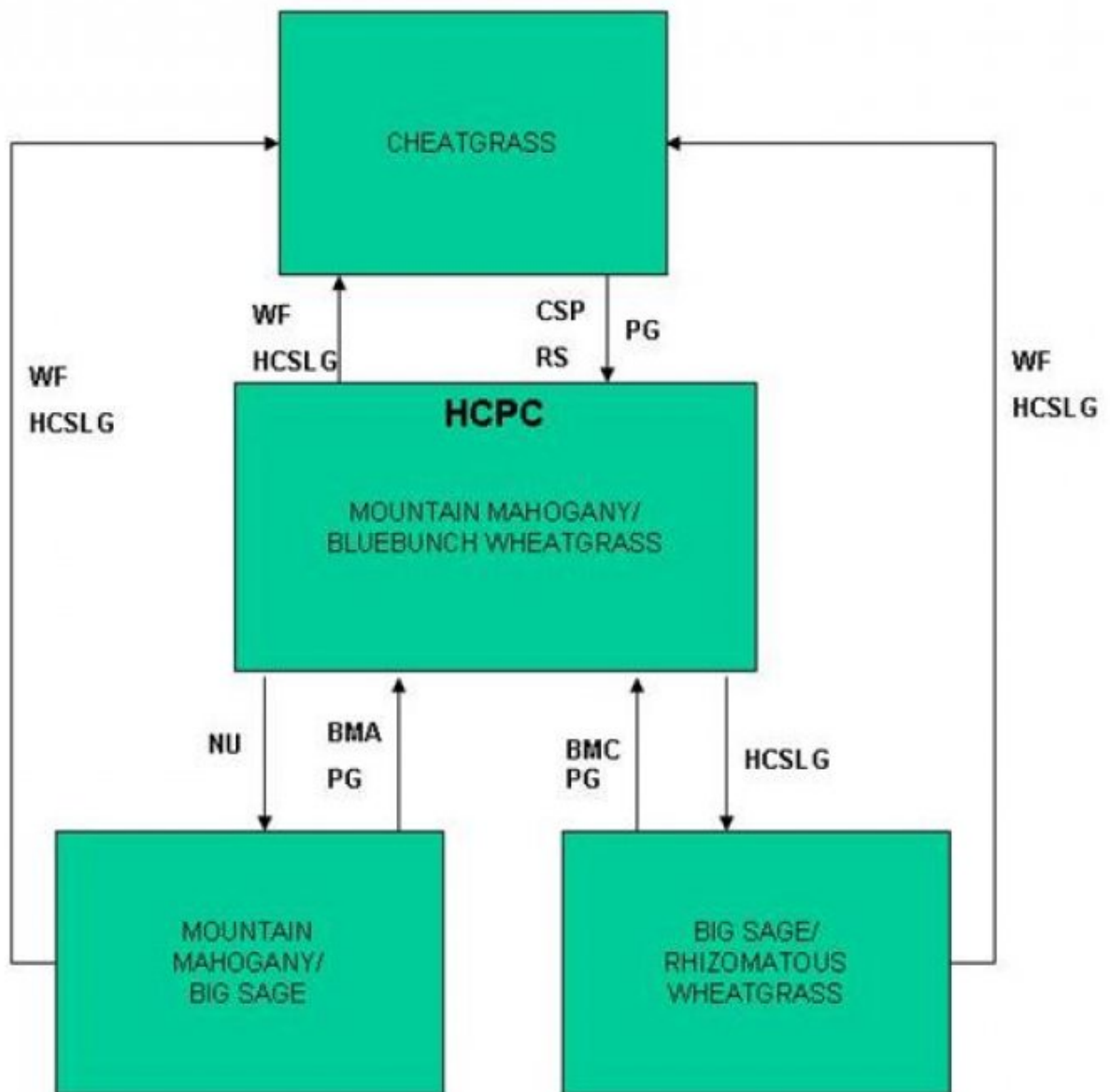
As this site deteriorates, species such as big sagebrush and rabbitbrush will increase. Cheatgrass may invade. Bluebunch wheatgrass, needleandthread, and mountain mahogany will decrease in frequency and production.

These plant communities narratives 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.

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  
Mountain Mahogany/Bluebunch Wheatgrass (HCPC)**

**Community 1.1  
Mountain Mahogany/Bluebunch Wheatgrass (HCPC)**

The interpretive plant community for this site is the Historic Climax Plant Community. Potential vegetation is estimated at 45% grasses or grass-like plants, 10% forbs, and 45% woody plants. The major grasses include bluebunch wheatgrass, rhizomatous wheatgrass, and needleandthread. Other grasses may include Canby and Sandberg bluegrass, upland sedges, prairie junegrass, and Indian ricegrass. Mountain mahogany is the dominant woody plant. Other woody plants may include big sagebrush, snowberry, green rabbitbrush, winterfat, and black sagebrush. A typical plant composition for this state consists of bluebunch wheatgrass 20-30%, rhizomatous wheatgrass 10-20%, needleandthread 10-20%, other grasses and grass-like plants 15-25%, perennial forbs 5-15%, mountain mahogany 40-50%, and 5-15% other woody species. Ground cover, by ocular estimate, varies from 25-35%. The total annual production (air-dry weight) of this state is about 900 pounds per acre, but it can range from about 700 lbs./acre in unfavorable years to about 1200 lbs./acre in above average years. The state is stable and well adapted to the Cool Central Desertic Basins and Plateaus climatic conditions. The diversity in plant species allows for high drought resistance. 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 will convert this plant community to the Mountain Mahogany/Big Sagebrush State. • Heavy Continuous Season-Long Grazing will convert this plant community to the Big Sagebrush/Rhizomatous Wheatgrass State. • Wildfire and Heavy Continuous Season-Long Grazing will convert this plant community to the Cheatgrass State.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	353	454	605
Shrub/Vine	353	454	605
Forb	78	101	135
<b>Total</b>	<b>784</b>	<b>1009</b>	<b>1345</b>

Figure 5. Plant community growth curve (percent production by month). WY0301, 34AC, Upland Sites. All Upland Sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	40	50			5			

**State 2  
Mountain Mahogany/Big Sagebrush**

**Community 2.1  
Mountain Mahogany/Big Sagebrush**

This plant community is a result of nonuse. Mountain mahogany and other woody plants dominate the site. The understory is composed of bunchgrasses such as bluebunch wheatgrass, needleandthread, and Indian ricegrass. The total annual production (air-dry weight) of this state is about 600 pounds per acre, but it can range from about 400 lbs./acre in unfavorable years to about 900 lbs./acre in above average years. 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. Transitional pathways leading to other plant communities are as follows: • Brush Management followed by deferment for 1 to 2 years as part of a Prescribed Grazing plan will return this state to near Historic Climax Plant Community (Mountain Mahogany/Bluebunch Wheatgrass State). Care should be taken when planning brush management to consider wildlife habitat and critical winter ranges. • Wildfire and Heavy Continuous Season-Long Grazing will convert this plant community to the Cheatgrass State.

Figure 6. Plant community growth curve (percent production by month).

WY0301, 34AC, Upland Sites. All Upland Sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	40	50			5			

### State 3

#### Big Sagebrush/Rhizomatous Wheatgrass

##### Community 3.1

#### Big Sagebrush/Rhizomatous Wheatgrass

This plant community is found under frequent and severe grazing. Although still a part of the plant community, mountain mahogany is no longer the dominant woody plant. Remaining plants are suppressed by browsing and have a hedged appearance. Big sagebrush, juniper, and green rabbitbrush are significant components of this plant community. Rhizomatous wheatgrass and bluegrasses dominate the understory. The total annual production (air-dry weight) of this state is about 400 pounds per acre, but it can range from about 200 lbs./acre in unfavorable years to about 700 lbs./acre in above average years. Soil erosion is accelerated because of increased bare ground. 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. Transitional 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 return this state to near Historic Climax Plant Community (Mountain Mahogany/Bluebunch Wheatgrass State). Care should be taken when planning brush management to consider wildlife habitat and critical winter ranges. • Wildfire and Heavy Continuous Season-Long Grazing will convert this plant community to the Cheatgrass State.

Figure 7. Plant community growth curve (percent production by month).  
WY0301, 34AC, Upland Sites. All Upland Sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	40	50			5			

### State 4

#### Cheatgrass

##### Community 4.1

#### Cheatgrass

This vegetation state is a result of wildfire or a hot prescribed fire. Woody plants are conspicuously absent with the exception of rabbitbrush. Cheatgrass often invades these sites, particularly on south and west facing slopes, effectively decreasing the fire frequency of the site, and preventing further shrub establishment. The total annual production (air-dry weight) of this state is about 100 pounds per acre, but it can range from about 50 lbs./acre in unfavorable years to about 250 lbs./acre in above average years. 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. Transitional 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 return this plant community to near Historic Climax Plant Community (Mountain Mahogany/Bluebunch Wheatgrass State) although cheatgrass will remain a part of the plant community. Additional deferment may be necessary and should be prescribed on an individual site basis.

Figure 8. Plant community growth curve (percent production by month).  
WY0301, 34AC, Upland Sites. All Upland Sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			5	40	50			5			

### Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1				202–303	
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	202–303	–
2				101–202	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	101–202	–
3				101–202	
	needle and thread	HECO26	<i>Hesperostipa comata</i>	101–202	–
4				151–252	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–50	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	0–50	–
	sedge	CAREX	<i>Carex</i>	0–50	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	0–50	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0–50	–
	muttongrass	POFE	<i>Poa fendleriana</i>	0–50	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	0–50	–
<b>Forb</b>					
5				50–151	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–50	–
	common yarrow	ACMI2	<i>Achillea millefolium</i>	0–50	–
	rosy pussytoes	ANRO2	<i>Antennaria rosea</i>	0–50	–
	milkvetch	ASTRA	<i>Astragalus</i>	0–50	–
	castilla	CAST1	<i>Castilla</i>	0–50	–
	pale bastard toadflax	COUMP	<i>Comandra umbellata ssp. pallida</i>	0–50	–
	tapertip hawksbeard	CRAC2	<i>Crepis acuminata</i>	0–50	–
	fleabane	ERIGE2	<i>Erigeron</i>	0–50	–
	buckwheat	ERIOG	<i>Eriogonum</i>	0–50	–
	aster	EUCEP2	<i>Eucephalus</i>	0–50	–
	granite prickly phlox	LIPU11	<i>Linanthus pungens</i>	0–50	–
	stoneseed	LITHO3	<i>Lithospermum</i>	0–50	–
	bluebells	MERTE	<i>Mertensia</i>	0–50	–
	nailwort	PARON	<i>Paronychia</i>	0–50	–
	beardtongue	PENST	<i>Penstemon</i>	0–50	–
	spiny phlox	PHHO	<i>Phlox hoodii</i>	0–50	–
	stonecrop	SEDUM	<i>Sedum</i>	0–50	–
	stemless mock goldenweed	STAC	<i>Stenotus acaulis</i>	0–50	–
	clover	TRIFO	<i>Trifolium</i>	0–50	–
	violet	VIOLA	<i>Viola</i>	0–50	–
<b>Shrub/Vine</b>					
6				404–504	
	mountain mahogany	CERCO	<i>Cercocarpus</i>	404–504	–

7				50–151	
	black sagebrush	ARNO4	<i>Artemisia nova</i>	0–50	–
	big sagebrush	ARTR2	<i>Artemisia tridentata</i>	0–50	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	0–50	–
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	0–50	–
	western snowberry	SYOC	<i>Symphoricarpos occidentalis</i>	0–50	–

## Animal community

### Animal Community – Wildlife Interpretations

Mountain Mahogany/Bluebunch Wheatgrass Plant Community (HCPC): This plant community provides excellent thermal and escape cover for wintering mule deer and elk. Year-round habitat is provided for mule deer, bobcat, cottontail rabbits, jackrabbits, sage grouse and many other birds such as the black-throated sparrow, lark sparrow, green-tailed towhee, and neotropical migrants. Mountain mahogany provides good thermal cover and nesting habitat for many bird species.

Mountain Mahogany/Big Sagebrush Plant Community: This plant community may be useful for the same wildlife that would use the Historic Climax Plant Community.

Big Sage/Rhizomatous Wheatgrass Plant Community: This plant community may be useful 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.

Cheatgrass Plant Community: This plant community exhibits a low level of plant species diversity. In most cases it is not a desirable plant community to select as a wildlife habitat management objective.

### 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.

#### Plant Community Production (lb./ac) and Carrying Capacity\* (AUM/ac)

Mountain Mahogany/Bluebunch Wheatgrass (HCPC) 700-1200 lb./ac and .2 AUM/ac

Mountain Mahogany/Big Sagebrush 400-900 lb./ac and .15 AUM/ac

Big Sage/ Rhizomatous Wheatgrass 200-700 lb./ac and .1 AUM/ac

Cheatgrass 50-250 lb./ac and .02 AUM/ac

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

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

## Hydrological functions

Water is the principal factor limiting forage production on this site. This site is highly variable and is dominated by



soils in hydrologic group B and C, with localized areas in hydrologic group D. Infiltration ranges from slow to very rapid. Runoff potential for this site varies from moderate to high depending on soil hydrologic group, depth to and permeability of bedrock, slope, and ground cover (refer to Part 630, NRCS National Engineering Handbook for detailed hydrology information).

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

## Recreational uses

This site provides hunting opportunities for upland game species. Variable topography, rock outcrop, and mountain mahogany appeal to hikers and wildlife viewers.

## 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: 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.

## Contributors

Karen 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	E. Bainter
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

1. **Number and extent of rills:** Some expected on this site. Where present, short and widely spaced.

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2. **Presence of water flow patterns:** Some can be observed.
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3. **Number and height of erosional pedestals or terracettes:** Rare to slight.
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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 20-50%.
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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 litter expected to move in small amounts downslope. Large woody debris from shrubs will show no movement.
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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 1 (interspaces) to 6 (under plant canopy), but average values should be 2.5 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. Described A-horizons are about 4 inches (10 cm) with OM of .5 to 1%.
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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 25-80% grasses, 10% forbs, and 10-65% shrubs. Unevenly distributed plant canopy (30-60%) and litter and slow infiltration rates result in slight to moderate runoff. Basal cover is typically less than 5% for this site and does very little to effect runoff on this site.
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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>>cool season rhizomatous grasses>>perennial forbs>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 5-20% of total canopy measurement with total litter (including beneath the plant canopy) from 20-60% expected. Herbaceous litter depth typically ranges from 3-10mm. 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: 700-1200 lb/ac (900 lb/ac average); Metric 784-1344 kg/ha (1008 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 75% and the presence of cheatgrass are the most common indicators of a threshold being crossed. Rabbitbrush, Wyoming big sagebrush, Sandberg bluegrass, and goldenweed are common increasers. 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 drought years.
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