

Ecological site R043BY160WY
Shallow Igneous
High Mountains

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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

R043BY116WY	Igneous High Mountains Igneous
R043BY162WY	Shallow Loamy High Mountains Shallow Loamy

Similar sites

R043BY116WY	Igneous High Mountains Igneous (Ig) 20+M has lower production and less bitterbrush.
R043BY260WY	Shallow Igneous Foothills and Mountains West Shallow Igneous (SwI) 15-19W has lower production.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site is found on rolling to steep mountain slopes and ridges.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Ridge (3) Escarpment
Flooding frequency	None
Ponding frequency	None
Elevation	1,980 – 3,660 m
Slope	10 – 70 %
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)	80 days
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Freeze-free period (average)	120 days
Precipitation total (average)	740 mm

Influencing water features

Soil features

These are shallow (10-20"), well-drained soils with medium to moderately coarse textures over igneous or volcanic bedrock. This site may also include some deep gravelly and/or cobbly soils on south and west facing slopes which react like shallow soils.

Table 4. Representative soil features

Surface texture	(1) Gravelly loam (2) Cobbly sandy loam (3) Very cobbly
Family particle size	(1) Loamy
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderate to moderately rapid
Soil depth	30 – 50 cm
Surface fragment cover <=3"	10 – 30 %
Surface fragment cover >3"	20 – 50 %
Available water capacity (0-101.6cm)	1.52 – 3.05 cm
Calcium carbonate equivalent (0-101.6cm)	Not specified
Electrical conductivity (0-101.6cm)	Not specified

Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	5.6 – 7.2
Subsurface fragment volume <=3" (Depth not specified)	20 – 30 %
Subsurface fragment volume >3" (Depth not specified)	30 – 50 %

Ecological dynamics

As this site deteriorates, species such as rhizomatous wheatgrass, bottlebrush squirreltail, three-tip and mountain big sagebrush, and snowberry will increase. Bluebunch wheatgrass, spike fescue, and bitterbrush will decrease in frequency and production.

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				588-757	
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	588-757	–
2				252-420	
	spike fescue	LEK12	<i>Leucopoa kingii</i>	252-420	–
3				84-252	
	thickspike wheatgrass	ELLAL	<i>Elymus lanceolatus ssp. lanceolatus</i>	84-252	–
4				168-336	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0-84	–
	Letterman's needlegrass	ACLE9	<i>Achnatherum lettermanii</i>	0-84	–
	Columbia needlegrass	ACNE9	<i>Achnatherum nelsonii</i>	0-84	–
	western needlegrass	ACOC3	<i>Achnatherum occidentale</i>	0-84	–

	bentgrass	AGROS2	<i>Agrostis</i>	0-84	–
	mountain brome	BRMA4	<i>Bromus marginatus</i>	0-84	–
	California oatgrass	DACA3	<i>Danthonia californica</i>	0-84	–
	timber oatgrass	DAIN	<i>Danthonia intermedia</i>	0-84	–
	onespike danthonia	DAUN	<i>Danthonia unispicata</i>	0-84	–
	squirreltail	ELELE	<i>Elymus elymoides</i> ssp. <i>elymoides</i>	0-84	–
	Idaho fescue	FEID	<i>Festuca idahoensis</i>	0-84	–
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	0-84	–
	oniongrass	MEBU	<i>Melica bulbosa</i>	0-84	–
	mountain muhly	MUMO	<i>Muhlenbergia montana</i>	0-84	–
	muttongrass	POFE	<i>Poa fendleriana</i>	0-84	–
	spike trisetum	TRSP2	<i>Trisetum spicatum</i>	0-84	–
Forb					
5				84-168	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0-84	–
	common yarrow	ACMI2	<i>Achillea millefolium</i>	0-84	–
	agoseris	AGOSE	<i>Agoseris</i>	0-84	–
	pussytoes	ANTEN	<i>Antennaria</i>	0-84	–
	milkvetch	ASTRA	<i>Astragalus</i>	0-84	–
	balsamroot	BALSA	<i>Balsamorhiza</i>	0-84	–
	Indian paintbrush	CASTI2	<i>Castilleja</i>	0-84	–
	fleabane	ERIGE2	<i>Erigeron</i>	0-84	–
	buckwheat	ERIOG	<i>Eriogonum</i>	0-84	–
	stoneseed	LITHO3	<i>Lithospermum</i>	0-84	–
	creeping barberry	MARE11	<i>Mahonia repens</i>	0-84	–
	bluebells	MERTE	<i>Mertensia</i>	0-84	–
	ragwort	PACKE	<i>Packera</i>	0-84	–
	phlox	PHLOX	<i>Phlox</i>	0-84	–
	ragwort	SENEC	<i>Senecio</i>	0-84	–
	snowberry	SYMPH	<i>Symphoricarpos</i>	0-84	–
	clover	TRIFO	<i>Trifolium</i>	0-84	–
	American vetch	VIAM	<i>Vicia americana</i>	0-84	–
	violet	VIOLA	<i>Viola</i>	0-84	–
Shrub/Vine					
6				168-252	
	antelope bitterbrush	PUTR2	<i>Purshia tridentata</i>	168-252	–
7				84-168	
	black sagebrush	ARNO4	<i>Artemisia nova</i>	84-168	–
8				84-252	
	Shrub, deciduous	2SD	<i>Shrub, deciduous</i>	0-84	–
	Shrub, evergreen	2SE	<i>Shrub, evergreen</i>	0-84	–
	Tree, deciduous	2TD	<i>Tree, deciduous</i>	0-84	–
	Tree, evergreen	2TE	<i>Tree, evergreen</i>	0-84	–
	threetip sagebrush	ARTR4	<i>Artemisia tripartita</i>	0-84	–
	mountain big sagebrush	ARTRV	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>	0-84	–
	snowbrush ceanothus	CEVE	<i>Ceanothus velutinus</i>	0-84	–

	snowberry	SYMPH	<i>Symphoricarpos</i>	0-84	–
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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 Bluebunch Wheatgrass/Bitterbrush Plant Community (HCPC): Suitable thermal and escape cover for most wildlife is limited due to the low height and density of woody plants. Bitterbrush and sagebrush provide important winter forage for mule deer and elk. Bitterbrush/Black Sage Plant Community: This plant community may be beneficial for the same wildlife that would use the Historic Climax Plant Community. Mountain Big Sage/Rhizomatous Wheatgrass 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. Three-Tip Sage 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. 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 (HCPC) 1200-1800 .45 Bitterbrush/Black Sage 1000-1600 .3 Mountain Big Sage/Rhizomatous Wheatgrass 800-1400 .2 Three-Tip Sage 500-1200 .1 * - 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 and degree of bedrock fracturing, 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. Cryptogamic crusts are present, but only cover 1-2% of the soil surface.

Recreational uses

This site provides limited hunting opportunities for upland game species.

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.

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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 0-25%.

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.
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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 2 (interspaces) to 6 (under plant canopy), but average values should be 3.5 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. Soil Organic Matter of less than 4-16% 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 50-75% grasses, 10% forbs, and 15-40% shrubs. Evenly distributed plant canopy (50-75%) and litter plus moderate infiltration rates result in minimal runoff. Basal cover is typically greater than 10% and affects runoff on this site. Surface rock fragments of 5-30% 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>> 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 15-20% of total canopy measurement with total litter (including beneath the plant canopy) from 50-80% 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: 1200-1800 lb/ac (1500 lb/ac average); Metric 1344-2016 kg/ha (1680 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 40% is the most common indicator of a threshold being crossed. Rabbitbrush, Sandberg bluegrass, buckwheat, yarrow, and phlox 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 extreme drought years.
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