Ecological site R032XY366WY
Shallow Sandy (SwSy)
10-14" East Precipitation Zone

Accessed: 06/02/2026

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

R032XY350WY	**Sandy (Sy) 10-14" East Precipitation Zone**
R032XY362WY	**Shallow Loamy (SwLy) 10-14" East Precipitation Zone**

Similar sites

R032XY266WY	**Shallow Sandy (SwSy) 5-9” Wind River Basin Precipitation Zone**
R032XY166WY	**Shallow Sandy (SwSy) 5-9” Big Horn Basin Precipitation Zone**

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site occurs on nearly level to 50% slopes.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Ridge (3) Escarpment

Elevation	1,650 – 2,290 m
Slope	0 – 50 %
Ponding depth	0 cm
Aspect	Aspect is not a significant factor

Climatic features

Annual precipitation ranges from 10-14 inches per year. The normal precipitation pattern shows the least amount of precipitation in December, January, and February, increasing to a peak during the latter part of May. Amounts decrease through June, July, and August and then increase some in September. Much of the moisture that falls in the latter part of the summer is lost by evaporation and much of the moisture that falls during the winter is lost by sublimation. Average snowfall exceeds 20 inches annually. 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, due to the high elevation and dry air, which permits rapid incoming and outgoing radiation. Cold air outbreaks from Canada in winter move rapidly from northwest to southeast and account for extreme minimum temperatures. Chinook winds may occur in winter and bring rapid rises in temperature. Extreme storms may occur during the winter, but most severely affect ranch operations during late winter and spring.

Winds are generally not strong as compared to the rest of the state. Daytime winds are generally stronger than nighttime and occasional strong storms may bring brief periods of high winds with gusts to more than 75 mph.

Growth of native cool-season plants begins about April 15 and continues to about July 15. Cool weather and moisture in September may produce some green up of cool season plants that will continue to late October.

The following information is from the “Thermopolis 2” climate station:
Minimum Maximum 5 yrs. out of 10 between
Frost-free period (days): 74 149 May 23 – September 16
Freeze-free period (days): 112 180 May 8 – October 1
Annual Precipitation (inches): 7.6 21.9

Mean annual precipitation: 12.35 inches
Mean annual air temperature: 46.2 F (30.1 F Avg. Min. to 62.3 F Avg. Max.)
For detailed information visit the Natural Resources Conservation Service National Water and Climate Center at http://www.wcc.nrcs.usda.gov/ website. Other climate station(s) representative of this precipitation zone include” Grass Creek 1E”, “Thermopolis”, Thermopolis 25NW”, “Buffalo Bill Dam” and “Black Mountain”.

Table 3 Representative climatic features

Frost-free period (average)	150 days
Freeze-free period (average)	180 days
Precipitation total (average)	360 mm

Influencing water features

Stream Type: None

Soil features

The soils of this site are shallow (10 - 20”to bedrock) well to excessively well-drained soils formed in eolian deposits or alluvium over residuum or residuum. These soils have rapid to very rapid permeability and may occur on all slopes. The bedrock may be of any kind except igneous or volcanic and is virtually impenetrable to plant roots. Thin ineffectual layers of other soil textures are disregarded. The soil characteristics having the most influence on the plant community are the shallow depths and light textures which can affect the available moisture.

Major Soil Series correlated to this site include: Blackhall, Rentsac, Byrnie

Other Soil Series in MLRA 32 correlated to this site include:

Parent Material Kind: residuum, alluvium, eolian deposits
Parent Material Origin: sandstone, shale, unspecified
Surface Texture: loamy fine sand, fine sandy loam, sandy loam, loamy sand, sand
Surface Texture Modifier: none
Subsurface Texture Group: sand
Surface Fragments ? 3” (% Cover): 0
Surface Fragments > 3” (%Cover): 0
Subsurface Fragments ? 3” (% Volume): 0 to 10
Subsurface Fragments > 3” (% Volume): 0

Minimum Maximum
Drainage Class: well excessive
Permeability Class: rapid very rapid
Depth (inches): 10 20
Electrical Conductivity (mmhos/cm) 20”: 0 2
Sodium Absorption Ratio 20”: 0 0
Soil Reaction (1:1 Water) 20”: 7.4 8.4
Soil Reaction (0.1M CaCl2) 20”: NA NA
Available Water Capacity (inches) 30”: 0.4 3.0
Calcium Carbonate Equivalent (percent) 20”: 0 10

Table 4. Representative soil features

Surface texture	(1) Loamy fine sand (2) Fine sandy loam (3) Sandy loam
Family particle size	(1) Sandy
Drainage class	Well drained to excessively drained
Permeability class	Rapid to very rapid
Soil depth	30 – 50 cm
Surface fragment cover <=3"	Not specified
Surface fragment cover >3"	Not specified

Available water capacity (0-101.6cm)	1.02 – 7.62 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 10 %
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	7.4 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	0 – 10 %
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

Potential vegetation on this site is dominated by mid cool-season perennial grasses. Other significant vegetation includes winterfat and a variety of forbs and shrubs. The expected potential composition for this site is about 75% grasses, 10% forbs and 15% woody plants. The composition and production will vary naturally due to historical use, fluctuating precipitation and fire frequency.

As this site deteriorates, species such as threadleaf sedge, blue grama, and big sagebrush will increase. Plains pricklypear and weedy annuals will invade. Cool season grasses such as needleandthread, bluebunch and Griffith's wheatgrasses, and Indian ricegrass 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.

Plant Community Narratives
Following are the narratives for each of the described plant communities. These plant communities 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.

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				84-140	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	84-140	–
2				84-140	
	Montana wheatgrass	ELAL7	*Elymus albicans*	84-140	–
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	84-140	–
3				28-84	
	needle and thread	HECO26	*Hesperostipa comata*	28-84	–
4				0-56	
	western wheatgrass	PASM	*Pascopyrum smithii*	0-56	–
5				28-84	
	Grass, perennial	2GP	*Grass, perennial*	0-28	–
	Fendler threeawn	ARPUL	*Aristida purpurea var. longiseta*	0-28	–
	blue grama	BOGR2	*Bouteloua gracilis*	0-28	–
	threadleaf sedge	CAFI	*Carex filifolia*	0-28	–
	squirreltail	ELEL5	*Elymus elymoides*	0-28	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0-28	–
	spike fescue	LEKI2	*Leucopoa kingii*	0-28	–
	green needlegrass	NAVI4	*Nassella viridula*	0-28	–
	Sandberg bluegrass	POSE	*Poa secunda*	0-28	–
7				0-84	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0-28	–
	black sagebrush	ARNO4	*Artemisia nova*	0-28	–
	big sagebrush	ARTR2	*Artemisia tridentata*	0-28	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0-28	–
	winterfat	KRASC	*Krascheninnikovia*	0-28	–
	skunkbush sumac	RHTR	*Rhus trilobata*	0-28	–
Forb					
6				0-56	
	Forb, perennial	2FP	*Forb, perennial*	0-28	–
	rosy pussytoes	ANRO2	*Antennaria rosea*	0-28	–
	woollypod milkvetch	ASPU9	*Astragalus purshii*	0-28	–
	Indian paintbrush	CASTI2	*Castilleja*	0-28	–
	little larkspur	DEBI	*Delphinium bicolor*	0-28	–
	fleabane	ERIGE2	*Erigeron*	0-28	–
	sulphur-flower buckwheat	ERUM	*Eriogonum umbellatum*	0-28	–
	leafy wildparsley	MUDI	*Musineon divaricatum*	0-28	–
	beardtongue	PENST	*Penstemon*	0-28	–
	phlox	PHLOX	*Phlox*	0-28	–
	lemon scurfpea	PSLA3	*Psoralidium lanceolatum*	0-28	–

	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	0-28	–
	smooth woodyaster	XYGL	*Xylorhiza glabriuscula*	0-28	–

Table 6. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 7. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Table 8. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)

Animal community

Animal Community – Wildlife Interpretations Historic Climax Plant Community: The predominance of grasses in this plant community favors grazers and mixed-feeders, such as bison, elk, and antelope. Suitable thermal and escape cover for deer may be limited due to the low quantities of woody plants. However, topographical variations could provide some escape cover. When found adjacent to sagebrush dominated states, this plant community may provide brood rearing/foraging areas for sage grouse, as well as lek sites. Other birds that would frequent this plant community include western meadowlarks, horned larks, and golden eagles. Many grassland obligate small mammals would occur here. Perennial Grass/Mixed Shrub Plant Community: The combination of a shrub overstory and an understory of grasses and forbs provide a very diverse plant community for wildlife. This diversity o provides important winter ranges, so mule deer and antelope may use this state for foraging and cover year-round, as would cottontail and jack rabbits. It provides important winter, nesting, brood-rearing, and foraging habitat for sage grouse. Brewer's sparrows' nest in big sagebrush plants, and hosts of other nesting birds utilize stands in the 20-30% cover range. Mixed Shrub/Blowout Dune Plant Community: These communities provide limited foraging for antelope and other grazers. They may be used as a foraging site by sage grouse if proximal to woody cover and if the Historic Climax Plant Community or the Perennial Grass/ Mixed Shrub Plant Community is limiting. Generally, these are not target plant communities for wildlife habitat management. Threadleaf Sedge Sod Plant Community: This plant community can supply some winter foraging for elk, mule deer and antelope, as sagebrush can approach 15% protein and 40-60% digestibility during that time. This community provides escape and thermal cover for large ungulates, as well as nesting habitat for sage grouse. 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) Historic Climax Plant Community 350-700 .20 Perennial Grass/Mixed Shrub 275-650 .17 Mixed Shrub/Blowout Dune 100-300 .05 Threadleaf Sedge Sod 225-400 .10 * - Continuous, season-long grazing by cattle under average growing conditions. Grazing by domestic livestock is one of the major income-producing industries in the area. Rangeland in this area may provide yearlong forage for cattle, sheep, or horses. During the dormant period, the forage for livestock use needs to be supplemented with protein because the quality does not meet minimum livestock requirements.

Hydrological functions

Water is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group B and C. Infiltration ranges from rapid to very rapid. 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. An example of an exception would be where short-grasses form a strong sod and dominate the site. 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 varieties of plants which bloom from spring until fall have an esthetic value that appeals to visitors.

Wood products

No appreciable wood products are present on the site.

Other products

none noted

Inventory data references

Information presented here has been derived from NRCS inventory data. Field observations from range trained personnel were also used. Those involved in developing this site include: Chris Krassin, Range Management Specialist, NRCS and Everet Bainter, Range Management Specialist. Other sources used as references include USDA NRCS Water and Climate Center, USDA NRCS National Range and Pasture Handbook, USDI and USDA Interpreting Indicators of Rangeland Health Version 3, and USDA NRCS Soil Surveys from various counties.

Contributors

Ray Gullion

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	05/02/2008
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.**

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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 25-55%.

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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 only in small amounts (to leeward side of shrubs). Large woody debris from sagebrush 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 2.7 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 vary from 1-10 inches (3-25 cm) with OM of .5 to 1.5%.

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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 65-80% grasses, 15% forbs, and 5-20% shrubs. Evenly distributed plant canopy (30-60%) and litter plus slow to moderately rapid infiltration rates result in minimal runoff. Basal cover is typically less than 5% for this site and does very little to effect runoff on this site. Surface rock fragments of 10-20% 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. A coarse, dry subsurface will often refuse a probe, causing misidentification of a compaction layer. Most soil profiles must be described by hand dug holes.

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

    Sub-dominant:

    Other:

    Additional:

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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 10-25% of total canopy measurement with total litter (including beneath the plant canopy) from 20-50% 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: 350-700 lb/ac (525 lb/ac average); Metric 392 -784 kg/ha (588 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% is the most common indicator of a threshold being crossed. Big sagebrush, threadleaf sedge, blue grama, Sandberg bluegrass, buckwheat, and phlox are common increasers. Annual weeds such as kochia, mustards, lambsquarter, and Russian thistle 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.
