

Ecological site R032XY154WY

Shale (Sh)

5-9" Big Horn Basin Precipitation Zone

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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

R032XY158WY	Shallow Clayey (SwCy) 5-9" Big Horn Basin Precipitation Zone
R032XY176WY	Very Shallow (VS) 5-9" Big Horn Basin Precipitation Zone

Similar sites

R032XY354WY	Shale (Sh) 10-14" East Precipitation Zone Shale 10-14" Foothills and Basins East P.Z., 032XY354WY, has higher production.
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Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site occurs on moderate to steep slopes and ridge tops.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Ridge (3) Escarpment
Flooding frequency	None

Ponding frequency	None
Elevation	1,130 – 1,830 m
Slope	0 – 60 %
Ponding depth	0 cm
Aspect	Aspect is not a significant factor

Climatic features

Annual precipitation ranges from 5-9 inches per year. The normal precipitation pattern shows peaks in May and June and a secondary peak in September. This amounts to about 50% of the mean annual precipitation. 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 is about 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.

High winds are generally blocked from the basin by high mountains, but can occur in conjunction with an occasional thunderstorm.

Growth of native cool-season plants begins about April 1 and continues to about July 1. 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 "Emblem" climate station:

Minimum Maximum 5 yrs. out of 10 between

Frost-free period (days): 98 171 May 13 – September 19

Freeze-free period (days): 120 184 May 1 – October 5

Mean Annual Precipitation (inches): 3.22 10.97

Mean annual precipitation: 7.42 inches

Mean annual air temperature: 45.01 F (31.2 F Avg. Min. to 58.7 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 "Basin", "Deaver", "Lovell" and "Worland".

Table 3 Representative climatic features

Frost-free period (average)	170 days
Freeze-free period (average)	180 days
Precipitation total (average)	230 mm

Influencing water features

Soil features

The soils of this site are very shallow (less than 8 inches to bedrock) well-drained soils formed from residuum. These soils have rapid to slow permeability and can be of any texture. This site usually occurs on steep slopes with many outcrops of shale bedrock. These clay shales are usually saline or alkaline in various degrees, and normally produce sparse stands of halophytes and saline tolerant grasses. The soil characteristics having the most influence on the plant community are the very shallow soils, which drastically reduces the amount of available moisture and potential quantities of soluble salts.

Table 4. Representative soil features

Surface texture	(1) Clay loam (2) Loam (3) Silt loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Slow to moderate
Soil depth	0 – 20 cm
Surface fragment cover ≤3"	0 – 10 %
Surface fragment cover >3"	0 – 10 %
Available water capacity (0-101.6cm)	1.52 – 5.08 cm
Calcium carbonate equivalent (0-101.6cm)	0 – 10 %
Electrical conductivity (0-101.6cm)	0 – 20 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0 – 10
Soil reaction (1:1 water) (0-101.6cm)	6.6 – 8.4

Subsurface fragment volume <=3" (Depth not specified)	10 – 20 %
Subsurface fragment volume >3" (Depth not specified)	Not specified

Ecological dynamics

Potential vegetation on this site is dominated by salt tolerant plants and drought resistant mid cool-season perennial grasses. The expected potential composition for this site is about 60% grasses, 15% forbs and 25% 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 short warm-season grasses, birdfoot sagebrush and woodyaster will increase. Plains pricklypear and weedy annuals will invade. Cool season grasses such as bluebunch wheatgrass, Indian ricegrass and western wheatgrass 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				26-50	
	squirreltail	ELELE	<i>Elymus elymoides ssp. elymoides</i>	26-50	–
2				17-34	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	17-34	–
3				9-26	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	9-26	–
4				0-17	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0-9	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	0-9	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	0-9	–
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	0-9	–
	alkali sacaton	SPAI	<i>Sporobolus airoides</i>	0-9	–
Forb					
5				0-9	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0-9	–
	milkvetch	ASTRA	<i>Astragalus</i>	0-9	–
	princesplume	STANL	<i>Stanleya</i>	0-9	–

	woodyaster	XYLOR	<i>Xylorhiza</i>	0-9	–
Shrub/Vine					
6				26-50	
	Gardner's saltbush	ATGA	<i>Atriplex gardneri</i>	26-50	–
7				0-17	
	birdfoot sagebrush	ARPE6	<i>Artemisia pedatifida</i>	0-17	–
8				0-9	
	bud sagebrush	PICRO	<i>Picrothamnus</i>	0-9	–
9				0-9	
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	0-9	–
10				0-9	
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	0-9	–

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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Animal community

Animal Community – Wildlife Interpretations Historic Climax Plant Community: 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. Due to the sparseness of the vegetation, this community does not provide escape and thermal cover for large ungulates or nesting habitat for sage grouse. Perennial Grass/Mixed Shrub: 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. Due to the sparseness of the vegetation, this community does not provide escape and thermal cover for large ungulates or nesting habitat for sage grouse. Birdfoot Sagebrush: This plant community can provide winter foraging for mule deer and antelope. Due to the sparseness of the vegetation, this community does not provide escape and thermal cover for large ungulates or for 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 85-250 .07 Perennial Grass/Mixed Shrub 25-150 .05 Birdfoot Sagebrush 15-150 .01 * - 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 D. Infiltration ranges from slow to moderate. Runoff potential for this site varies from moderate to very high 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 will be continuous on slopes > 9% and gullies may be present on steeper slopes. Water flow paths will be obvious, regular and continuous with debris dams occurring only on lesser slopes. Erosional pedestals present with terracettes present at debris dams in association with bunchgrasses such as bluebunch wheatgrass. Plant litter movement is expected on steeper slopes but typically falls in place and signs of movement are not common on slopes of 9%. 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. 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 19 1965-1986 WY Park & others

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: Rills will be continuous.
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2. Presence of water flow patterns: Water flow paths will be obvious, regular and continuous with debris dams occurring only on lesser slopes.

3. Number and height of erosional pedestals or terracettes: Erosional pedestals present with terracettes present at debris dams.

4. Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground): Bare ground is 75 to 85%.

5. Number of gullies and erosion associated with gullies: Active gullies may be present on steeper slopes.

6. Extent of wind scoured, blowouts and/or depositional areas: None.

7. Amount of litter movement (describe size and distance expected to travel): Plant litter movement is expected.

8. Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values): Plant cover and litter is at 15% or greater of soil surface. Stability class anticipated to be 3 or greater.

9. Soil surface structure and SOM content (include type of structure and A-horizon color and thickness): Use soil series description for depth and color of A-horizon.

10. Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff: Sparse plant canopy, slow infiltration rates, and the high amount of bare ground contribute to a naturally high runoff rate even in HCPC.

11. Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site): No compaction layer would be expected but soil surface is typically crusted and hard to very hard when dry.

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 stature grasses >> shrubs > forbs > short stature grasses/grasslikes

Sub-dominant:

Other:

Additional:

13. Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):
Some plant mortality and decadence (10 to 15%) is expected on this site.

14. Average percent litter cover (%) and depth (in): Average litter cover is 5-10% with depths of 0.1 to 0.2 inches. Litter cover is in contact with soil surface with little evidence of biological activity.

15. Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):
100 lbs/acre

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: Birdfoot sagebrush, Woodyaster, Short warm-season grasses, Annuals, Exotics, and Species found on Noxious Weed List.

17. Perennial plant reproductive capability: Limited ability to reproduce.
