

Ecological site R032XY146WY Sands (Sa) 5-9" Big Horn Basin Precipitation Zone

Accessed: 05/03/2024

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.

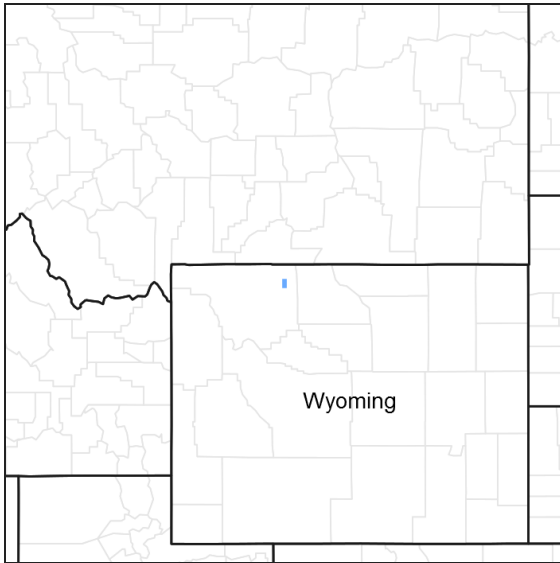


Figure 1. Mapped extent

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

R032XY166WY	Shallow Sandy (SwSy) 5-9" Big Horn Basin Precipitation Zone
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Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site occurs on nearly level to 30% slopes.

Table 2. Representative physiographic features

Landforms	(1) Alluvial fan (2) Hill (3) Plateau
Flooding frequency	None

Ponding frequency	None
Elevation	1,128–1,829 m
Slope	0–30%
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)	171 days
Freeze-free period (average)	184 days
Precipitation total (average)	229 mm

Influencing water features

Soil features

The soils of this site are moderately deep (greater than 20” to bedrock) to very deep, well-drained soils that formed in alluvium, alluvium over residuum, or eolian deposits. These soils have moderate, moderately rapid, or rapid permeability. The surface soil will vary from 3 to 6 inches deep. The coarser topsoils may be included if underlain by finer textured subsoil. The soil characteristic having the most influence on plant community is the light texture which can affect the available moisture.

Table 4. Representative soil features

Surface texture	(1) Fine sandy loam (2) Sandy loam (3) Loamy very fine sand
Family particle size	(1) Sandy
Drainage class	Well drained to excessively drained
Permeability class	Moderately rapid to rapid
Soil depth	51–152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-101.6cm)	4.57–10.67 cm
Calcium carbonate equivalent (0-101.6cm)	0–5%
Electrical conductivity (0-101.6cm)	0–4 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–5
Soil reaction (1:1 water) (0-101.6cm)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

Ecological Dynamics of the Site:

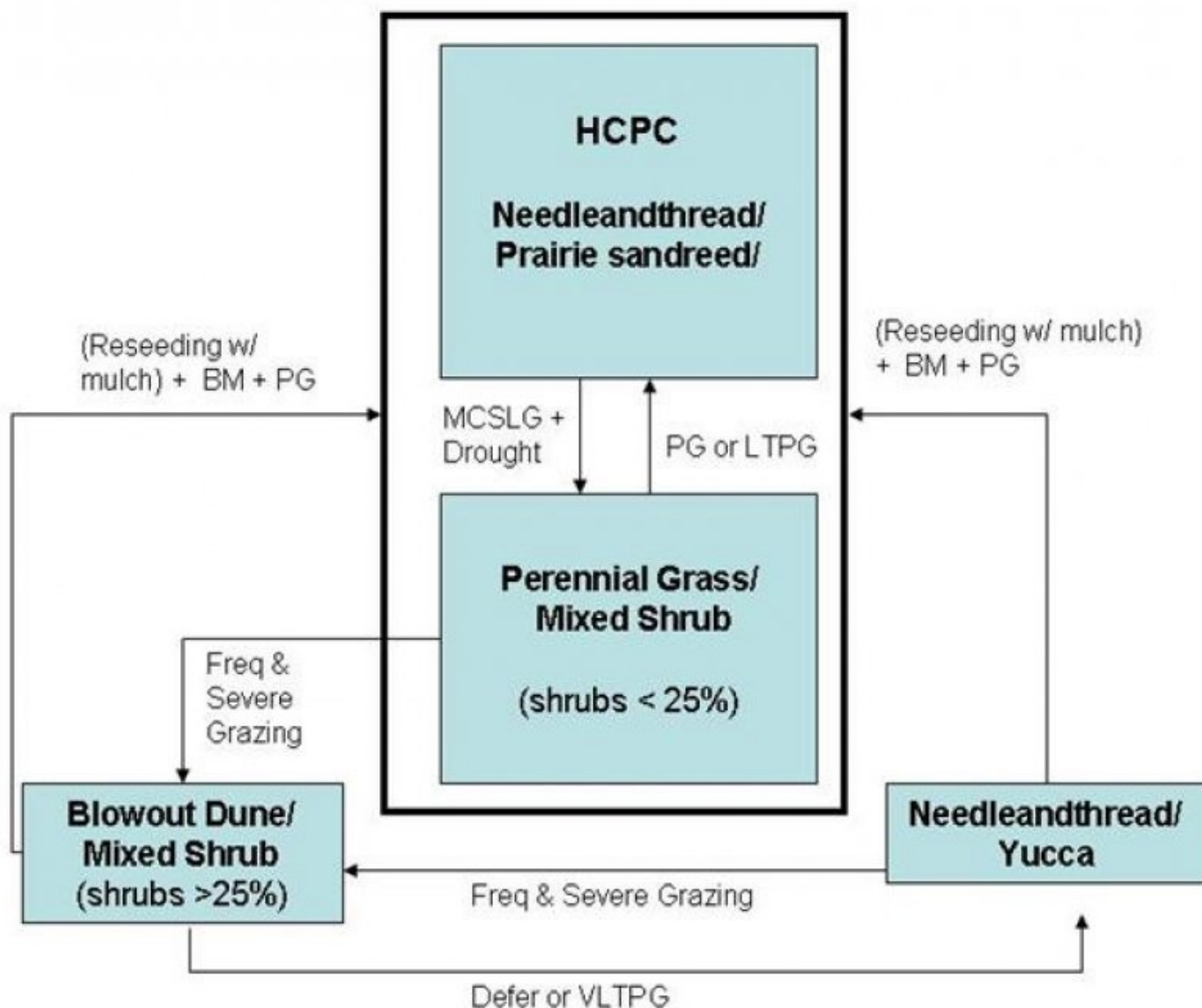
Potential vegetation on this site is dominated by tall and mid perennial grasses. Other significant vegetation includes winterfat, fourwing saltbush, and silver and big sagebrush, and a variety of forbs. The expected potential composition for this site is about 70% grasses, 10% forbs and 20% woody plants. The composition and production will vary naturally due to historical use, fluctuating precipitation and fire frequency.

As this site deteriorates, species such as silver sagebrush, green and rubber rabbitbrush, and big sagebrush will increase. Plains pricklypear and weedy annuals will invade. Mid-grasses such as needleandthread, prairie sandreed 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.

State and transition model



BM - Brush Management (fire, chemical, mechanical)

Freq. & Severe Grazing - Frequent and Severe Utilization of the Cool-season Mid-grasses during the Growing Season

GLMT - Grazing Land Mechanical Treatment

LTPG - Long-term Prescribed Grazing

MCSLG - Moderate, Continuous Season-long Grazing

NU, NF - No Use and No Fire

PG - Prescribed Grazing (proper stocking rates with adequate recovery periods during the growing season)

VLTPG - Very Long-term Prescribed Grazing (could possibly take generations)

WF - Wildfire

State 1

Needleandthread/Prairie sandreed Plant Community

Community 1.1

Needleandthread/Prairie sandreed Plant Community

The interpretive plant community for this site is the Historic Climax Plant Community. This state evolved with grazing by large herbivores and periodic fires. The cyclical natural of the fire regime in this community prevented big sagebrush from being the dominant landscape. This plant community can be found on areas that are properly managed with grazing and/or prescribed burning, and on areas receiving occasional short periods of rest. The state is a mix of warm and cool season mid and tall grasses. Potential vegetation is about 70% grasses or grass-like plants, 10% forbs, and 20% woody plants. The major grasses include needleandthread, prairie sandreed, and Indian ricegrass. Other grasses occurring in the state include rhizomatous wheatgrasses, Sandberg bluegrass, blue grama and red threeawn. Fourwing saltbush, winterfat and silver and big sagebrush are conspicuous components of this state. A variety of forbs also occurs in this state and plant diversity is high (see Plant Composition Table). The total annual production (air-dry weight) of this state is about 500 pounds per acre, but it can range from about 350 lbs. /acre in unfavorable years to about 700 lbs. /acre in above average years. The state is stable and well adapted to the Northern Intermountain Desertic Basins 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: • Moderate, Continuous Season-Long grazing will convert the plant community to the Perennial Grass/Mixed Shrub Plant Community. Prolonged drought will exacerbate this transition.

Figure 4. Plant community growth curve (percent production by month). WY0501, 5-9BH Upland sites. Monthly percentages of total annual growth for all upland sites with dominantly C3 Cool season plants..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			15	50	20	5		10			

State 2

Perennial Grass/Mixed Shrub Plant Community

Community 2.1

Perennial Grass/Mixed Shrub Plant Community

Historically, this plant community evolved under grazing by bison and a low fire frequency. Currently, this site normally is found under a moderate, season-long grazing regime and extended periods without fire is now common. Prolonged drought can also play an important role under these grazing regimes and will exacerbate these conditions. Shrubs such as silver and big sagebrushes, yucca, and green rabbitbrush, make up less than 25% of the total annual production. Mid and tall perennial grasses make up the majority of the understory with the balance made up of short, warm-season grasses, and miscellaneous forbs. The understory of grass and grass-like plants includes needleandthread, prairie sandreed, rhizomatous wheatgrasses, blue grama and red threeawn. Forbs commonly found in this plant community include scarlet globemallow, fringed sagewort, lemon scurfpea, sulfur buckwheat, sandwort, hairy goldaster, and phlox. The overstory of brush and understory of grass and forbs provide a diverse plant community. When compared to the Historic Climax Plant Community, Indian ricegrass, and winterfat have decreased. Indian ricegrass may occur in only trace amounts under the sagebrush canopy or within the patches of pricklypear. Blue grama, big and silver sagebrush, and yucca have increased. Plains pricklypear cactus will also have increased, but occurs only in small patches. 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 525 lbs. /acre in above average years. This plant community is resistant to change. The herbaceous species present are well adapted to grazing; however, species composition can be altered through long-term overgrazing. The herbaceous component is mostly intact and plant vigor and replacement capabilities are sufficient. Incidence of pedestalling is minimal. Soils are mostly stable, but areas of wind-scouring and deposition are noticeable in small patches. The watershed is functioning and the biotic community is intact. Transitional pathways leading to other plant communities are as follows: • Prescribed grazing or possibly long-term prescribed grazing is needed to return this state to near Historic Climax Plant Community condition. • Frequent and severe grazing, will convert the plant community to the Blowout Dune/Mixed Shrub Plant Community.

Figure 5. Plant community growth curve (percent production by month). WY0501, 5-9BH Upland sites. Monthly percentages of total annual growth for all upland sites with dominantly C3 Cool season plants..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			15	50	20	5		10			

State 3 Blowout Dune/Mixed Shrub Plant Community

Community 3.1 Blowout Dune/Mixed Shrub Plant Community

This plant community is the result of frequent and severe grazing and protection from fire. Bare sand and shrubs dominate this plant community, as the annual production of sagebrush, green rabbitbrush and yucca will exceed 25% of the total. Yucca can become a dominant plant on this site especially if browsing of the yucca during the bloom growth stage is removed. These shrub species are a significant component of the plant community and the preferred cool season grasses have been eliminated or greatly reduced. The dominant grasses are Sandberg bluegrass and blue grama. Weedy annual species such as cheatgrass, Russian thistle, kochia, and a variety of mustards may occupy the site if seed sources are available. Patches of pricklypear cactus can be noticeable. The interspaces between plants have expanded leaving the amount of bare ground more prevalent. Grass production as well as total production is significantly reduced. The total annual production (air-dry weight) of this state is about 150 pounds per acre, but it can range from about 100 lbs. /acre in unfavorable years to about 300 lbs. /acre in above average years. This plant community is relatively resistant to change. Continued frequent and severe grazing does not seem to affect the plant composition or structure of the plant community. These areas are more resistant to fire as less fine fuels are available and the bare ground between the shrub plants is increased. Plant diversity is poor. Production is reduced and plant vigor is diminished due to herbivore grazing and blowing sand, which can defoliate the vegetative parts of the grass plants. The soils are not protected from wind as erosion is accelerated and blowouts will increase. Pedestalling is pervasive and eolian deposits (dunes) form around the clumped vegetation. This situation is normally extensive. Transitions or pathways leading to other plant communities are as follows: • Deferment of use or very long-term grazing prescribed grazing, will convert this plant community to the Needleandthread/Yucca Plant Community. • Reseeding with mulch with brush management and prescribed grazing is necessary to return a protective vegetation cover to this state so as to convert this to near HCPC. The grazing prescription most commonly used is complete deferment during the growing season with limited use in the winter. This will provide as much plant litter cover as possible to protect the soil surface.

Figure 6. Plant community growth curve (percent production by month). WY0501, 5-9BH Upland sites. Monthly percentages of total annual growth for all upland sites with dominantly C3 Cool season plants..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			15	50	20	5		10			

State 4 Needleandthread/Yucca Plant Community

Community 4.1 Needleandthread/Yucca Plant Community

This plant community can occur where the Blowout Dune/Mixed Shrub Plant Community is deferred from grazing or under very long term prescribed grazing practices. Shrubs and especially yucca remain a significant component of the plant community but grasses, especially needleandthread, have reestablished on the bare sands areas. Pricklypear cactus can also become established in dense patches. The shrub and yucca component is present but is mostly localized to the original areas occupied on the ridgeline of the dunes. The blowout areas and dune slopes are now mostly covered with needleandthread. Other important grasses are the rhizomatous wheatgrasses when present, threeawns, and Sandberg bluegrass. Patches of annuals such as cheatgrass and other weedy annual forbs such as halogeton, Russian thistle, and kochia, will persist on this site. Noxious weeds such as Russian

knapweed may also remain if not treated. The interspaces between plants will have diminished in size. When compared with the HCPC or the Mixed Shrub/ Perennial Grass Plant Communities, the annual production is less. Most of the climax grasses are not present such as Indian ricegrass and prairie sandreed. The total annual production (air-dry weight) of this state is about 250 pounds per acre, but it can range from about 100 lbs. /acre in unfavorable years to about 325 lbs. /acre in above average years. This state is somewhat resistant to change under moderate grazing and the reestablishment of perennial mid and tall grasses is difficult in this situation. The biotic integrity of this state is minimally functional and plant diversity is moderate to low. Erosion has been diminished as the grassed areas are resistant to wind erosive processes. The remnant dune formations should not be confused with current wind erosion processes. Pedestalling is still apparent along the grassed edges, but is not progressing. Transitional pathways leading to other plant communities are as follows: • Reseeding with mulch with brush management and prescribed grazing is necessary to return a protective vegetation cover to this state so as to convert this to near HCPC. The grazing prescription most commonly used is complete deferment during the growing season with limited use in the winter. This will provide as much plant litter cover as possible to protect the soil surface. • Frequent and severe grazing will return the plant community to the Blowout Dune/Mixed Shrub Plant Community.

Figure 7. Plant community growth curve (percent production by month). WY0501, 5-9BH Upland sites. Monthly percentages of total annual growth for all upland sites with dominantly C3 Cool season plants..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			15	50	20	5		10			

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1				28–56	
	thickspike wheatgrass	ELLA3	<i>Elymus lanceolatus</i>	28–56	–
	thickspike wheatgrass	ELLAL	<i>Elymus lanceolatus ssp. lanceolatus</i>	28–56	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	28–56	–
2				112–224	
	needle and thread	HECO26	<i>Hesperostipa comata</i>	112–224	–
3				112–168	
	prairie sandreed	CALO	<i>Calamovilfa longifolia</i>	112–168	–
4				56–112	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	56–112	–
5				0–56	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–28	–
	threeawn	ARIST	<i>Aristida</i>	0–28	–
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	0–28	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	0–28	–
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	0–28	–
Forb					
6				6–56	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–28	–
	textile onion	ALTE	<i>Allium textile</i>	0–28	–
	desertparsley	LOMAT	<i>Lomatium</i>	0–28	–
	phlox	PHLOX	<i>Phlox</i>	0–28	–
	scarlet globemallow	SPCO	<i>Sphaeralcea coccinea</i>	0–28	–
Shrub/Vine					
7				0–56	
	silver sagebrush	ARCA13	<i>Artemisia cana</i>	0–56	–
8				0–56	
	spiny hopsage	GRSP	<i>Grayia spinosa</i>	0–56	–
9				6–84	
	Shrub (>.5m)	2SHRUB	<i>Shrub (>.5m)</i>	0–28	–
	big sagebrush	ARTR2	<i>Artemisia tridentata</i>	0–28	–
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	0–28	–
	shadscale saltbush	ATCO	<i>Atriplex confertifolia</i>	0–28	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	0–28	–
	rubber rabbitbrush	ERNA10	<i>Ericameria nauseosa</i>	0–28	–
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	0–28	–
	yucca	YUCCA	<i>Yucca</i>	0–28	–

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: These communities provide limited grazing for antelope and other herbivores. They may be used as a foraging site by sage grouse if proximal to woody cover.

Blowout Dune/Mixed Shrub Plant Community: This community may provide 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 Mixed Shrub/Perennial Grass Plant Community is limiting. Generally, these are not target plant communities for wildlife habitat management.

Needleandthread/Yucca Plant Community: This community may provide 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 Mixed Shrub/Perennial Grass Plant Community is limited.

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 200-525 .16

Blowout Dune/Mixed Shrub 75-300 .05

Needleandthread/Yucca 100-325 .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, with localized areas in hydrologic group C. Infiltration potential for this site varies from moderately rapid to rapid depending on soil hydrologic group and ground cover. Runoff varies from low to moderate. 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. 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	02/19/2008
Approved by	E. Bainter
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills should not be present
-

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

3. **Number and height of erosional pedestals or terracettes:** Essentially non-existent
-
4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is 25-35% occurring in small areas throughout site
-
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:** Active blowouts should not be present
-
7. **Amount of litter movement (describe size and distance expected to travel):** Little to no plant litter movement. Plant litter remains in place and is not moved by erosional forces.
-
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 60% or greater of soil surface and maintains soil surface integrity. Soil Stability class is anticipated to be 4 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:** Grass canopy and basal cover should reduce raindrop impact and slow overland flow providing increased time for infiltration to occur. Healthy deep rooted native grasses enhance infiltration and reduce runoff. Infiltration is Moderately rapid to Very Rapid.
-
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 or soil surface crusting should be present.
-
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: Tall and Mid stature Grasses > Shrubs > Forbs > Short stature grasses/grasslikes
-
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or**

decadence): Very Low

14. **Average percent litter cover (%) and depth (in):**

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 500 lbs/ac

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:** Threadleaf sedge, Threeawns, Yucca, Skunkbush sumac, Big sagebrush, Annuals, Exotics, Unpalatable forbs, and Species found on Noxious Weed List

17. **Perennial plant reproductive capability:** All species are capable of reproducing
