USDA Natural Resources
Conservation Service

Ecological site R034AY350WY
Sandy High Plains Southeast (Sy)

Accessed: 05/11/2025

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.

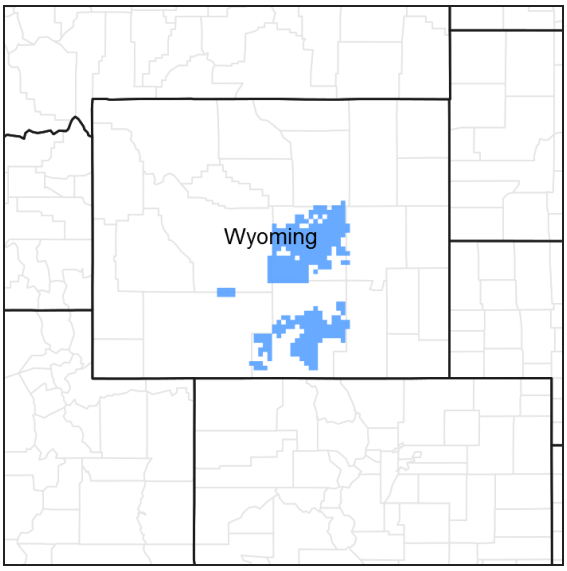


Figure 1. Mapped extent

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.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site usually occurs in an upland position on relatively flat to moderately sloping land. Slopes commonly range from 1 to 15%.

Table 2. Representative physiographic features

Landforms	(1) Alluvial fan (2) Hill (3) Plateau
Flooding frequency	None
Ponding frequency	None
Elevation	1,676–2,286 m
Slope	0–30%

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 June 15. Some green up of cool season plants usually occurs in September.

The following information is from the “Laramie” climate station:
Minimum Maximum 5 yrs. out of 10 between
Frost-free period (days): 57 149 June 1 – September 16
Freeze-free period (days): 94 183 May 15 – September 28
Annual Precipitation (inches): 5.8 17.34

Mean annual precipitation: 11.53 inches
Mean annual air temperature: 42.2 F (30.4 F Avg. Min. to 53.9 F Avg. Max.)
For detailed information visit the Natural Resources Conservation Service National Water and Climate Center at http://www.wcc.nrcs.usda.gov/ website. Other climate station(s) representative of this precipitation zone include ”Dixon ” and “Medicine Bow”.

Table 3. Representative climatic features

Frost-free period (average)	149 days
Freeze-free period (average)	183 days
Precipitation total (average)	356 mm

Influencing water features

Stream type: None

Soil features

These soils are mostly deep (greater than 20 inches) and well drained. Surface layers are 5 inches or more thick with sandy loam to sandy clay loam subsoils.

Table 4. Representative soil features

Surface texture	(1) Fine sandy loam (2) Sandy loam (3) Loamy fine sand
Family particle size	(1) Sandy
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderate to rapid
Soil depth	51–152 cm

Surface fragment cover <=3"	0–15%
Surface fragment cover >3"	0–5%
Available water capacity (0-101.6cm)	6.35–11.43 cm
Calcium carbonate equivalent (0-101.6cm)	0–5%
Electrical conductivity (0-101.6cm)	0–40 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)	0–15%
Subsurface fragment volume >3" (Depth not specified)	0–10%

Ecological dynamics

Ecological Dynamics of the Site:

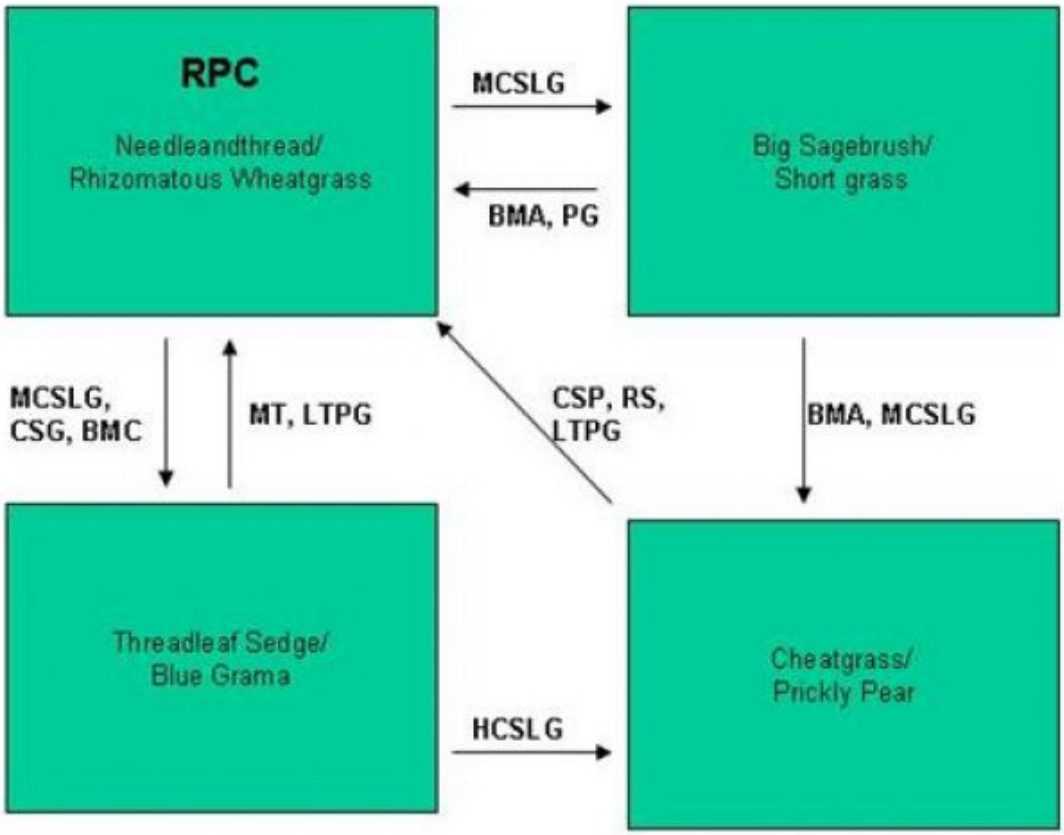
As this site deteriorates from improper grazing management, woody species such as big sagebrush and silver sagebrush will increase. Bunchgrasses such as Indian ricegrass and needleandthread will decrease in frequency and production.

Big sagebrush will become dominant on some areas with an absence of fire. Wildfires are often actively controlled so chemical control using herbicides has replaced the historic role of fire on this site. Recently, prescribed burning has regained some popularity.

The Reference Plant Community (RPC) (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)
MCSLG – Moderate Continuous Season Long Grazing

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
Needleandthread/Rhizomatous Wheatgrass Plant Community (RPC)

Community 1.1
Needleandthread/Rhizomatous Wheatgrass Plant Community (RPC)

The interpretive plant community for this site is the Reference Plant Community. Potential vegetation is estimated at 75% grasses or grass-like plants, 10% forbs and 15% woody plants. The major grasses include needleandthread, Indian ricegrass, and rhizomatous wheatgrass. Big and silver sagebrush are the major woody plants. A typical plant composition for this state consists of needleandthread 20-50%, rhizomatous wheatgrass 15-25%, Indian ricegrass 10-20%, perennial forbs 5-10%,and shrubs 5-10%. Ground cover, by ocular estimate, varies from 35-45%.The total annual production (air-dry weight) of this state is about 1200 pounds per acre, but it can range from about 700 lbs/acre in unfavorable years to about 1500 lbs/acre in above average years.This state is extremely stable and well adapted to the Cool Central Desertic Basins and Plateaus climate. 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 Big Sagebrush/Shortgrass Plant Community if big sagebrush is present at 5-10%.• Moderate Continuous Season-long Grazing or Continuous Spring Grazing with Brush Management (chemical) will convert the plant community to the Threadleaf Sedge/Blue grama Plant Community.

Figure 4. Plant community growth curve (percent production by month). WY0901, 34AI, Upland Sites. All Upland Sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	10	35	40	10	0	5	0	0	0

State 2
Big Sagebrush/Shortgrass Plant Community

Community 2.1
Big Sagebrush/Shortgrass Plant Community

This plant community is the result of moderate continuous season long grazing of the RPC. Big sagebrush dominates the site with an understory of prairie junegrass, threadleaf sedge, blue grama, and other short grass and grasslike plants. When compared to the RPC, needleandthread and Indian ricegrass have decreased, rhizomatous wheatgrasses remain. 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 1100 lbs./acre in above average years. The soil is somewhat protected and erosion may increase if management is not changed. The biotic integrity may be reduced due to loss of mid grasses and diversity. The watershed is functioning but nearing at risk stage. Transitional pathways leading to other plant communities are as follows: • Brush Management and Prescribed Grazing will return this state to near Reference Plant Community (Needleandthread/Rhizomatous Wheatgrass Plant Community). • Brush Management with Moderate Continuous Season-long Grazing will convert the plant community to the Cheatgrass/Prickly Pear Plant Community.

Figure 5. Plant community growth curve (percent production by month). WY0901, 34AI, Upland Sites. All Upland Sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	10	35	40	10	0	5	0	0	0

State 3
Threadleaf Sedge/Blue grama

Community 3.1
Threadleaf Sedge/Blue grama

This plant community is a result of moderate continuous season-long grazing or continuous spring grazing in the absence of big sagebrush. Needleandthread and Indian ricegrass give way to shorter stature grasses such as prairie junegrass, Sandberg bluegrass, and threadleaf sedge. Rhizomatous wheatgrasses have also decreased. Forbs such as Hoods phlox, aster, and fringed sagewort are common. The total annual production (air-dry weight) of this state is about 700 pounds per acre, but it can range from about 400 lbs./acre in unfavorable years to about 900 lbs./acre in above average years. This state is somewhat stable but vulnerable to excessive erosion. The biotic integrity of this plant community is at risk or non-functioning. The watershed is usually at risk or non-functioning as bare ground increases. Transitional pathways leading to other plant communities are as follows: • Mechanical Treatment (Chiseling, etc.) followed by Prescribed Grazing or Long-term Prescribed Grazing may eventually return this state to near Reference Plant Community (Needleandthread/Rhizomatous Wheatgrass Plant Community). • Heavy Continuous Season Long Grazing will lead this community to the Cheatgrass/Prickly Pear Plant Community.

Figure 6. Plant community growth curve (percent production by month). WY0901, 34AI, Upland Sites. All Upland Sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	10	35	40	10	0	5	0	0	0

State 4
Cheatgrass/Prickly Pear

Community 4.1
Cheatgrass/Prickly Pear

This plant community is a result of moderate to heavy continuous season-long grazing and brush management practices. Most desirable species have been removed allowing establishment of cheatgrass and other annuals. Prickly pear cactus is a large component of this community and provides refuge and seed source for blue grama, needleandthread, and other species. The total annual production (air-dry weight) of this state is about 200 pounds per acre, but it can range from about 50 lbs./acre in unfavorable years to about 300 lbs./acre in above average years. This state is unstable and vulnerable to excessive erosion. The biotic integrity of this plant community is at risk or non-functioning. The watershed is usually at risk or non-functioning as bare ground increases. Transitional pathways leading to other plant communities are as follows: Chemical Seedbed Preparation and Reseeding followed by Prescribed Grazing or Long-term Prescribed Grazing may eventually return this state to near Reference Plant Community (Needleandthread/Rhizomatous Wheatgrass Plant Community).

Figure 7. Plant community growth curve (percent production by month). WY0901, 34AI, Upland Sites. All Upland Sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	10	35	40	10	0	5	0	0	0

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				269–673	
	needle and thread	HECO26	*Hesperostipa comata*	269–673	–
2				202–336	
	thickspike wheatgrass	ELLAL	*Elymus lanceolatus ssp. lanceolatus*	202–336	–
3				135–269	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	135–269	–
4				67–135	
	squirreltail	ELEL5	*Elymus elymoides*	67–135	–

5				67–135	
	threadleaf sedge	CAFI	*Carex filifolia*	67–135	–
6				67–202	
	Grass, perennial	2GP	*Grass, perennial*	0–67	–
		ACBL	*Achnatherum ×bloomeri*	0–67	–
	blue grama	BOGR2	*Bouteloua gracilis*	0–67	–
	prairie sandreed	CALO	*Calamovilfa longifolia*	0–67	–
	plains reedgrass	CAMO	*Calamagrostis montanensis*	0–67	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	0–67	–
	mountain muhly	MUMO	*Muhlenbergia montana*	0–67	–
	muttongrass	POFE	*Poa fendleriana*	0–67	–
	Sandberg bluegrass	POSE	*Poa secunda*	0–67	–
	bluebunch wheatgrass	PSSP6	*Pseudoroegneria spicata*	0–67	–
	sand dropseed	SPCR	*Sporobolus cryptandrus*	0–67	–
Forb					
7				67–135	
	Forb, perennial	2FP	*Forb, perennial*	0–67	–
	prairie sagewort	ARFR4	*Artemisia frigida*	0–67	–
	bastard toadflax	COUM	*Comandra umbellata*	0–67	–
	buckwheat	ERIOG	*Eriogonum*	0–67	–
	aster	EUCEP2	*Eucephalus*	0–67	–
	rush skeletonplant	LYJU	*Lygodesmia juncea*	0–67	–
	beardtongue	PENST	*Penstemon*	0–67	–
	spiny phlox	PHHO	*Phlox hoodii*	0–67	–
	scurfpea	PSORA2	*Psoralidium*	0–67	–
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	0–67	–
	deathcamas	ZIGAD	*Zigadenus*	0–67	–
Shrub/Vine					
8				67–135	
	silver sagebrush	ARCA13	*Artemisia cana*	67–135	–
	Wyoming big sagebrush	ARTRW8	*Artemisia tridentata ssp. wyomingensis*	67–135	–
9				67–135	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	0–67	–
	black sagebrush	ARNO4	*Artemisia nova*	0–67	–
	shadscale saltbush	ATCO	*Atriplex confertifolia*	0–67	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	0–67	–
	winterfat	KRLA2	*Krascheninnikovia lanata*	0–67	–
	antelope bitterbrush	PUTR2	*Purshia tridentata*	0–67	–
	spineless horsebrush	TECA2	*Tetradymia canescens*	0–67	–

Animal community

Animal Community – Wildlife Interpretations
Needleandthread/Rhizomatous Wheatgrass Plant Community (RPC): The predominance of grasses in this plant

community favors grazers and mixed feeders such as antelope and elk. Suitable thermal and escape cover is limited to topographical variances. When found adjacent to sagebrush dominated sites, this plant community may provide brood rearing and foraging opportunities for sage grouse, as well as lek sites. Other birds and mammals visit this site and may include meadow larks, raptors, rabbits, and ground squirrels.

Big Sagebrush/Short Grass Plant Community: This plant community may be useful for the same wildlife that would use the Reference Plant Community. Additional cover is available in this community but foraging resources have been reduced.

Threadleaf Sedge/Blue Grama Plant Community: This plant community may be beneficial for the same wildlife that would use the Reference Plant Community. However, the plant community composition is less diverse, and thus, less apt to meet the seasonal needs of these animals.

Cheatgrass/Prickly Pear Plant Community: This plant community provides very little wildlife habitat. Early season forage is available from cheatgrass.

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)
Needleandthread/Rhizomatous Wheatgrass (RPC) 700-1500 0.4
Big Sagebrush/Short Grass 700-1100 0.3
Threadleaf Sedge/Blue Grama 400-900 0.2
Cheatgrass/Prickly Pear 50-300 0.06

* - 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. 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. Cryptogrammic 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 esthetic values that appeal to visitors.

Wood products

No appreciable wood products are present on the site.

Other products

None noted.

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. 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 69 1967-1988 WY Carbon
& others

Contributors

B. Brazee

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.

Author(s)/participant(s)	
Contact for lead author	
Date	05/01/2005
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

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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:** Essentially non-existent

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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 is 20-30% occurring in small areas throughout site

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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:** None

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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.

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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):** Plant cover and litter is at 70% or greater of soil surface and maintains soil surface integrity. Soil Stability class is anticipated to be 4 or greater.

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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

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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 Rapid.

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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):** No compaction layer or soil surface crusting should be present.

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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 stature Bunch Grasses > Mid Stature Rhizomatous Grasses >Shrubs > Short stature Grasses/Grasslike > Forbs

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Very Low

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14. **Average percent litter cover (%) and depth (in):** Average litter cover is 25-35% with depths of 0.25 to 1.0 inches

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 1200 lbs/ac

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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:** Threadleaf sedge, Fringed sagewort, Prickly Pear, Cheatgrass and other annuals, and Species found on Noxious Weed List

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