

Ecological site R043BY408WY

Coarse Upland (CU) 15-19” Northern Plains Precipitation Zone

Accessed: 05/19/2024

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

R043BY434WY	<b>Rocky Hills (RH) 15-19” Northern Plains Precipitation Zone</b> Rocky Hills
R043BY462WY	<b>Shallow Loamy (SwLy) 15-19” Northern Plains Precipitation Zone</b> Shallow Loamy
R043BY476WY	<b>Very Shallow (VS) 15-19” Northern Plains Precipitation Zone</b> Very Shallow

Similar sites

R058BY162WY	<b>Shallow Loamy (SwLy) 10-14” PZ</b> Shallow Loamy 10-14” Northern Plains P.Z., has lower production.
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Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

## Physiographic features

This site occurs in most positions and may be found on all degrees of slope.

**Table 2. Representative physiographic features**

Landforms	(1) Hill (2) Alluvial fan (3) Ridge
Flooding frequency	None
Ponding frequency	None
Elevation	1,128–2,286 m
Slope	0–50%
Ponding depth	0 cm
Aspect	Aspect is not a significant factor

## Climatic features

Annual precipitation ranges from 15" to 19" per year. May is generally the wettest month. July, August and September are somewhat drier with daily amounts rarely exceeding one inch. Snowfall is quite heavy in the mountainous area. Annual snowfall averages close to 70 inches.

Sunshine is abundant in the latter part of the summer, the greatest amount being in July and August. Sunshine possibility during these two months averages 70 to 75% possibility with only a 65% possibility for June and September. Winter averages about 40% sunshine.

Because of the varied topography, the wind will vary considerably for different parts of the area. The wind is usually much lighter at the lower elevations and in the valleys as compared with the higher terrain. The average winter wind velocity is 8.5 mph, while the summer wind velocity averages 7.5 mph. Winds during storms and on ridges may exceed 45 mph.

Temperatures show a wide range between summer and winter, and between daily maximums and minimums. Summer nights are cool and temperatures drop into the forties at most places before sunrise. Summer daytime temperatures are usually in the seventies and occasionally reach eighty, but rarely reach the mid nineties. Winters are cold with daily lows below freezing most of the time. January has the coldest temperatures with a range of near 10 deg. F at night to the mid thirties in the afternoon. Temperatures of well below zero to –30 deg. F are not uncommon in the winter months.

The growing season for the cool season plants will generally start about April 15 to May 1 and continue to about October 10.

The following information is from the "Sheridan Airport" climate station:

Frost-free period (32 °F): 95-156 days; (5 yrs. out of 10, these days will occur between May 21 – September 19)

Freeze-free period 28 °F): 116-187 days; (5 yrs. out of 10, these days will occur between May 4 – September 29)

Mean annual precipitation: 14.7 inches

Mean annual air temperature: 45.0 °F (31.2 °F Avg. Min. – 58.8 °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: "Parkman 5 WNW"

**Table 3. Representative climatic features**

Frost-free period (average)	156 days
Freeze-free period (average)	187 days

Precipitation total (average)	483 mm
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## Influencing water features

Stream type: None

## Soil features

This site consists of boulderly or cobbly soils. The first 20" of soil must contain at least 35% by volume of coarse fragments that exceed 3 inch diameter. Because of the cobble and boulders, the soils cannot store as much water for plant use as other deep soils. Plants can root below 20" in these soils. Soil surfaces are relatively stable. Because of these characteristics, plant density is reduced.

**Table 4. Representative soil features**

Surface texture	(1) Gravelly loam (2) Cobbly sandy loam (3) Very fine sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate to moderately rapid
Soil depth	51–152 cm
Surface fragment cover ≤3"	0–20%
Surface fragment cover >3"	0–10%
Available water capacity (0–101.6cm)	4.57–13.72 cm
Calcium carbonate equivalent (0–101.6cm)	0–10%
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)	0–25%
Subsurface fragment volume >3" (Depth not specified)	0–35%

## Ecological dynamics

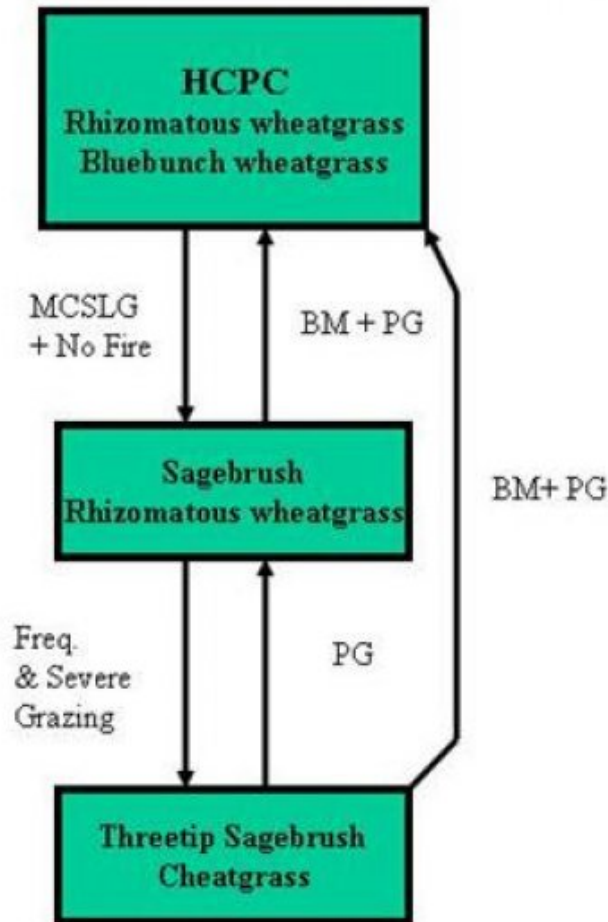
As this site deteriorates from improper grazing management, species such as rhizomatous wheatgrasses, sandberg bluegrass, spike trisetum, threetip sagebrush and big sagebrush will increase. Cool season grasses such as bluebunch wheatgrass, spike fescue, Idaho fescue and Columbia needlegrass will decrease 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)

Na - found adjacent to a saline site

**State 1**  
**Rhizomatous Wheatgrass/ Bluebunch Wheatgrass Plant Community**

**Community 1.1**  
**Rhizomatous Wheatgrass/ Bluebunch Wheatgrass Plant Community**

The interpretive plant community for this site is the Historic Climax Plant Community. This state evolved with grazing by large herbivores and is well suited for grazing by domestic livestock. Potential vegetation is about 80% grasses or grass-like plants, 10% forbs, and 10% woody plants. The state is dominated by cool season midgrasses. The major grasses include bluebunch wheatgrass, rhizomatous wheatgrasses, Columbia needlegrass, Idaho fescue, and spike fescue. Other grasses occurring on the state include, big bluegrass, Canby bluegrass, mountain brome, slender wheatgrass, one-spike oatgrass, and spike trisetum. Big sagebrush and three tip sagebrush are a conspicuous element of this state, occurring in a mosaic pattern, and making up 5 to 10% of the annual production. Annual production on this state ranges from 600 to 1100 pounds depending on climatic conditions. This plant community is extremely stable and well adapted to the Northern Great Plains climatic conditions. The diversity in plant species allows for high drought tolerance. 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: • Improper grazing and lack of fire, will convert this plant community to the Sagebrush/Rhizomatous wheatgrass Vegetation State. • Heavy, continuous season-long grazing and lack of fire will convert the plant community to the Threetip sagebrush/Cheatgrass Vegetation State.

Figure 4. Plant community growth curve (percent production by month).  
WY1301, 15-19NP Upland sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	45	35	10	0	5	0	0	0

**State 2**  
**Sagebrush/Rhizomatous Wheatgrass Plant Community**

**Community 2.1**  
**Sagebrush/Rhizomatous Wheatgrass Plant Community**

Historically, this plant community evolved under grazing by bison and a high fire frequency. Currently, it is found under moderate, season-long grazing by livestock in the absence of fire or brush control. Big sagebrush, and threetip sagebrush are significant components of this plant community. Cool-season grasses make up the majority of the understory with the balance made up of annual cool-season grasses, and miscellaneous forbs. Dominant grasses include rhizomatous wheatgrasses, spike fescue, one-spike oatgrass, and Sandberg bluegrass. Grasses of secondary importance include Idaho fescue, prairie junegrass, spike trisetum and Columbia needlegrass. Forbs, commonly found in this plant community, include western yarrow, field chickweed, prairie thermopsis and phlox. Sagebrush canopy ranges from 20% to 30%. Fringed sagewort is commonly found. Plains pricklypear and winterfat can also occur. When compared to the Historical Climax Plant Community, sagebrush has increased. Bluebunch wheatgrass, spike fescue and Columbia needlegrass have decreased, often occurring only where protected from grazing by the sagebrush canopy. Production of cool-season grasses has also been reduced. Cheatgrass (downy brome) has invaded the site. The overstory of sagebrush and understory of grass and forbs provide a diverse plant community which will support domestic livestock and wildlife such as mule deer and antelope. Annual production ranges from 500 to 900 pounds. The site is at risk for excessive erosion. The biotic integrity of this plant community is usually intact. However, it can be at risk depending on how far a shift has occurred in plant composition toward juniper, sagebrush, and/or cheatgrass. The watershed is usually functioning. However, it can become at risk when canopy cover of juniper, sagebrush, cheatgrass, and/or bare ground increases. Transitions or pathways leading to other plant communities are as follows: • Brush management (fire) followed by 1 or 2 years deferment and proper grazing use will return this state to near Historic Climax Plant Community. • Heavy Improper grazing management over the long-term will convert this state to the Threetip Sagebrush/Cheatgrass Vegetation State.

Figure 5. Plant community growth curve (percent production by month).  
WY1301, 15-19NP Upland sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	45	35	10	0	5	0	0	0

### State 3 Threetip Sagebrush/Cheatgrass Plant Community

#### Community 3.1 Threetip Sagebrush/Cheatgrass Plant Community

This vegetation state currently is found under heavy, season-long grazing by livestock in the absence of fire or brush control. Threetip sagebrush and big sagebrush are significant components of this plant community. Cool-season grasses have been reduced. Bare ground and cool-season annual plants dominate the understory. Perennial grasses are sparse, and include rhizomatous wheatgrasses, bluebunch wheatgrass, Sandberg bluegrass and prairie junegrass. Grasses of secondary importance include one-spike oatgrass, prairie junegrass, and Sandberg bluegrass. Cheatgrass is the dominant grass. Forbs, commonly found in this plant community, include phlox, ball head sandwort, hairy goldaster, prairie thermopsis and scarlet globemallow. Threetip sagebrush canopy ranges from 20% to 30%. Fringed sagewort is commonly found. Plains pricklypear and winterfat can also occur. Annual production ranges from 250 to 600 pounds. When compared to the Historical Climax Plant Community, sagebrush has increased. Bluebunch wheatgrass, spike fescue, and Idaho fescue have decreased, often occurring only where protected from grazing by the sagebrush canopy. Production of cool-season grasses has also been reduced. Cheatgrass (downy brome) has invaded the site. Bare ground has increased. The overstory of sagebrush reduces the grass understory and reduces the site's ability to support wildlife. The state is unstable and is not protected from excessive erosion. The biotic integrity of this plant community is not intact. This state is at risk depending on how far a shift has occurred in plant composition toward sagebrush, and cheatgrass. The watershed is not functioning. Transitions or pathways leading to other plant communities are as follows: Brush management (fire) and cheatgrass control followed by 1 or 2 years deferment and proper grazing use will return this state to near Historic Climax Plant Community. Proper grazing use over the long term with cheatgrass control will return this state to the Sagebrush/Rhizomatous wheatgrass state.

Figure 6. Plant community growth curve (percent production by month).  
WY1301, 15-19NP Upland sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	5	45	35	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 (%)
<b>Grass/Grasslike</b>					
1				106–267	
	Columbia needlegrass	ACNE9	<i>Achnatherum nelsonii</i>	106–267	–
2				106–267	
	Idaho fescue	FEID	<i>Festuca idahoensis</i>	106–267	–
3				106–213	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	106–213	–
4				54–106	
	spike fescue	LEK12	<i>Leucopoa kingii</i>	54–106	–
5				54–106	
	bluebunch wheatgrass	PSSP6	<i>Pseudoroegneria spicata</i>	54–106	–

6				54–106	
	prairie Junegrass	KOMA	<i>Koeleria macrantha</i>	54–106	–
7				54–160	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–54	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	0–54	–
	nodding brome	BRAN	<i>Bromus anomalus</i>	0–54	–
	Pumpelly's brome	BRINP5	<i>Bromus inermis ssp. pumpellianus var. pumpellianus</i>	0–54	–
	mountain brome	BRMA4	<i>Bromus marginatus</i>	0–54	–
	onespike danthonia	DAUN	<i>Danthonia unispicata</i>	0–54	–
	slender wheatgrass	ELTRT	<i>Elymus trachycaulus ssp. trachycaulus</i>	0–54	–
	mountain muhly	MUMO	<i>Muhlenbergia montana</i>	0–54	–
	muttongrass	POFE	<i>Poa fendleriana</i>	0–54	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	0–54	–
	spike trisetum	TRSP2	<i>Trisetum spicatum</i>	0–54	–
<b>Forb</b>					
8				54–106	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–54	–
	yarrow	ACHIL	<i>Achillea</i>	0–54	–
	field chickweed	CEAR4	<i>Cerastium arvense</i>	0–54	–
	larkspur	DELPH	<i>Delphinium</i>	0–54	–
	aster	EUCEP2	<i>Eucephalus</i>	0–54	–
	lupine	LUPIN	<i>Lupinus</i>	0–54	–
	phlox	PHLOX	<i>Phlox</i>	0–54	–
<b>Shrub/Vine</b>					
9				0–54	
	big sagebrush	ARTR2	<i>Artemisia tridentata</i>	0–54	–
10				0–54	
	threetip sagebrush	ARTR4	<i>Artemisia tripartita</i>	0–54	–
11				0–54	
	Shrub (>.5m)	2SHRUB	<i>Shrub (&gt;.5m)</i>	0–54	–

## Animal community

### Animal Community – Wildlife Interpretations

#### Rhizomatous Wheatgrass/Bluebunch Wheatgrass Plant Community (HCPC):

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. Due to the location of these sites on the foot slopes of mountains they are valuable for elk and deer winter ranges. 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.

#### Sagebrush/Rhizomatous Wheatgrass Plant Community:



The combination of an overstory of sagebrush and an understory of grasses and forbs provide a very diverse plant community for wildlife. The crowns of sagebrush tend to break up hard crusted snow on winter ranges, so mule deer and antelope may use this state for foraging and cover year-round, as would cottontail and jack rabbits. Due to the location of these sites on the foot slopes of mountains they are valuable for elk and deer winter ranges. 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.

Threetip Sagebrush/Cheatgrass Plant Community: This plant community may be useful for the same large grazers that would use the Historic Climax Plant Community. Due to the location of these sites on the foot slopes of mountains they are valuable for elk and deer winter ranges. However, the plant community composition is less diverse, and thus, less apt to meet the seasonal needs of these animals. It may provide some foraging opportunities for sage grouse when it occurs proximal to woody cover. Good grasshopper habitat equals good foraging for birds.

#### 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)

Rhizomatous WG/Bluebunch Wheatgrass 600-1100 .5

Sagebrush/Rhizomatous wheatgrass 500-900 .4

Threetip sagebrush/Cheatgrass 250-600 .3

\* - 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, with localized areas in hydrologic group D. Infiltration ranges from moderate to moderately rapid. Runoff potential for this site varies from moderate to 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 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 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 hunting opportunities for upland game species. The wide variety 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

Inventory Data References (narrative)

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range trained personnel was 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 1971-1994 WY

Ocular estimates 1990-1999 WY

## Contributors

G. Mitchell

## 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	01/01/2005
Approved by	E. Bainter
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

- Number and extent of rills:** Due to the wide slope range associated with this site, the number and extent of rills will vary from none on slope < 9% to common on slopes > 25%

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- Presence of water flow patterns:** Due to the wide slope range associated with this site, water flow patterns vary from barely observable on slopes of < 9% from broken and irregular in appearance to continuous on slopes > 25%

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- Number and height of erosional pedestals or terracettes:** Not evident on slopes < 9% present on slopes > 9%

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- Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not**

**bare ground):** Bare ground is 10-15%. 20-50% of soil surface is coarse fragments

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5. **Number of gullies and erosion associated with gullies:** Active restricted to concentrated water flow patterns on steeper slopes
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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 on slopes < 9%. Litter movement does occur on slopes > 9%
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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 50% 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. Infiltration varies with soil texture from 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 Cool Season Grasses > Forbs = Short stature Grasses/Grasslike = Shrubs

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Some plant mortality and decadence is expected
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14. **Average percent litter cover (%) and depth ( in):** Average litter cover is 10-15% with depths of 0.10 to 0.25 inches

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 950 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:** Cheatgrass, Phlox, threetip sagebrush, big sagebrush and Species found on Noxious Weed List

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17. **Perennial plant reproductive capability:** May be Limited due to effective moisture and seed to soil contact

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