

# Ecological site R034BY212UT

## Semidesert Loam (Wyoming Big Sagebrush)

Last updated: 3/05/2022  
 Accessed: 06/01/2026

### General information

**Provisional.** A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

### MLRA notes

Major Land Resource Area (MLRA): 034B–Warm Central Desertic Basins and Plateaus

MLRA 34B occurs in is in Utah (70 percent) and Colorado (30 percent). It makes up about 12,850 square miles (33,290 square kilometers). A small part of the area is in the High Plateaus of Utah Section of the Colorado Plateaus Province of the Intermontane Plateaus. The northern part of the MLRA occurs in the Uinta Basin Section, which is bounded by the Uinta Mountains to the north, the Wasatch Range to the west, the Roan Plateau to the south, and the Rabbit Hills to the east. The southern part of the MLRA occurs in the northern third of the Canyon Lands Section. This section is bounded by the Roan Plateau to the north, the Wasatch Plateau to the west, the southern end of the San Rafael Swell to the south, and the western slope of the Rocky Mountains to the east. Elevation ranges from 4,100 feet (1,250 meters) near Green River, Utah, to 7,500 feet (2,285 meters) at the base of the Wasatch Range and the Roan Plateau. Most of this area is covered by residual basin-floor materials and materials washed in from the surrounding mountains and plateaus. Shale and sandstone are the dominant rock types. The Tertiary-age Green River, Uinta, and Duchesne Formations dominate the northern part of the MLRA. The southern part is dominated by Cretaceous-age materials with lesser amounts of Jurassic and Triassic materials. The dominant Cretaceous formations are Mancos Shale, Dakota Sandstone, and the members of the Mesa Verde Group. The dominant Jurassic formations are the Morrison, Entrada, and Navajo. The dominant Triassic formations are the Chinle and Moenkopi. Quaternary alluvial, eolian, and glacial deposits occur in both parts of the MLRA. The average annual precipitation in most of this area ranges from 6 to 10 inches (150 to 255 millimeters). A small part of this area receives as much as 24 inches of annual precipitation. Much of the precipitation occurs as high-intensity, convective thunderstorms during the period July through September. May and June are usually the drier months. Precipitation is more evenly distributed throughout the year in the northern part of the MLRA than in the southern part, where there is a significant peak in late summer. The northern part of the MLRA receives more precipitation as snow during winter than the southern part. The average annual temperature ranges from 41 to 54 degrees F (5 to 12 degrees C). The freeze-free period averages 170 days and ranges from 110 to 235 days. The dominant soil orders in this MLRA are Aridisols and Entisols. Mollisols occur at the higher elevations, particularly in the northern part of the MLRA. The dominant soil temperature regime is mesic, and the dominant soil moisture regime is aridic. The soils receiving less than 8 inches (205 millimeters) of precipitation annually have an aridic soil moisture regime. The soils receiving 8 to 12 inches (205 to 305 millimeters) have an aridic soil moisture regime that borders on ustic. The soils receiving 12 to 16 inches (305 to 405 millimeters) generally have an ustic soil moisture regime that borders on aridic. The dominant soil mineralogy is mixed and soils are formed in slope alluvium or residuum derived from shale or sandstone. Many of the soils are shallow or moderately deep to shale or sandstone bedrock. The soils at the lower elevations generally have significant amounts of calcium carbonate, salts, and gypsum.

### Ecological site concept

Characteristic soils in this site are deep and well-drained. They formed in alluvium and colluvium derived mainly from mixed sedimentary parent materials. The soils are generally fine-loamy with a surface texture of loam, fine sandy loam or silty clay loam. Permeability is moderate-slow to moderate and runoff is medium. The water supplying capacity is 3 to 7 inches. Average annual soil loss in potential is approximately 0.5 to 1.5 tons/acre. The soil surface may be covered with gravels or cobbles to the extent of 40 percent of area.

### Associated sites

<b>R034BY216UT</b>	<p><b>Semidesert Sandy Loam (Fourwing Saltbush)</b></p> <p>Semidesert Sandy Loam (Fourwing saltbush)</p>
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<b>R034BY233UT</b>	<b>Semidesert Shallow Loam (Utah Juniper-Pinyon)</b> Semidesert Shallow Loam (Utah juniper-Pinyon)
<b>R034BY247UT</b>	<b>Semidesert Stony Loam (Utah Juniper-Pinyon)</b> Semidesert Stony Loam (Utah juniper-Pinyon)

### Similar sites

<b>R034BY205UT</b>	<b>Semidesert Gravelly Loam (Wyoming Big Sagebrush)</b> Semidesert gravelly loam (Wyoming big sagebrush)
<b>R034BY206UT</b>	<b>Semidesert Gravelly Sandy Loam (Wyoming Big Sagebrush)</b> Semidesert sandy gravelly loam (Wyoming big sagebrush)

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Artemisia tridentata ssp. wyomingensis</i>
Herbaceous	(1) <i>Achnatherum hymenoides</i>

### Physiographic features

This site occurs on alluvial fans, terraces, pediment foot slopes, toe slopes and occasionally in drainages. Slopes are mostly 1 to 25 percent, but may range up to 40 percent. Elevations range from 5,300 to 6,800 feet on all aspects.

Table 2. Representative physiographic features

Landforms	(1) Fan remnant (2) Alluvial fan (3) Hill
Runoff class	Medium to high
Flooding frequency	None
Ponding frequency	None
Elevation	1,620 – 2,070 m

Slope	0 – 30 %
Ponding depth	Not specified
Water table depth	Not specified
Aspect	Aspect is not a significant factor

### Climatic features

Average annual precipitation is 8 to 12 inches. Approximately 60% occurs as rain from March through September. On the average, November through February are the driest months and July through October are the wettest months. The mean annual air temperature is 10 degrees Celsius and the soil temperatures are in the mesic regime. The average freeze-free period is 127 to 151 days. In average years, plants begin growth around March 30 and end growth around September 30.

Table 3 Representative climatic features

Frost-free period (characteristic range)	
Freeze-free period (characteristic range)	130-150 days
Precipitation total (characteristic range)	200-310 mm

### Climate stations used

- (1) ALTAMONT [USC00420074], Altamont, UT
- (2) VERNAL MUNICIPAL AP [USW00094030], Vernal, UT
- (3) NEOLA [USC00426123], Roosevelt, UT

### Influencing water features

Due to its landscape position, this site is not influenced by streams or wetlands.

### Soil features

Characteristic soils in this site are deep and well-drained. They formed in alluvium and slope alluvium derived mainly from mixed sedimentary parent materials. The soils are generally fine-loamy with a surface texture of loam, fine sandy loam or silty clay loam. Permeability is moderate-slow to moderate and runoff is medium. The water supplying capacity is 3 to 7 inches. Average annual soil loss in potential is approximately 0.5 to 1.5 tons/acre. The soil surface may be covered with gravels or cobbles to the extent of 40 percent of area.

Modal Soil: Abra L 3-8%, 1-3% — fine-loamy, mixed, mesic Ustollic Calciorthids

Soil Survey Area: 047:

Abra L 3-8%, 1-3% GR-SL 3-25%; Abra GR-SL 25-40% Eroded; Abra VFSL CL Cob Substr 1-3%; Baldfield SiC 1-3%; Hazmaz L 1-3%, 2-5% GR-L 3-8%; Honlu SL 1-8% CBV-SL 8-15%; Lapoint CL 2-4%; Curcreek VFSL Dry 3-8%; Paradox CL 3-8% L 3-8%; Paradox L 3-8%, 1-3%, 8-25% Eroded; Paradox SiC 1-3%; Sinkson L 2-5%, 5-8%; Mikim L 3-15% CB-CL 8-25%; Mikim L 25-40% Eroded 1-3%; Mikim GR-L 2-8%; Penistaja FSL 3-8%; Alldown L 2-5%, 5-8%; Bowbac SL 2-5%; Cerrillos CL 2-5%; Creered SiL Dry 2-4%; Glenberg Family 3-6%; Haverdad L 1-8%; Hernandez Family 1-3%, 3-8%; Barx FSL 1-5% and Sazi FLS 3-8%

Table 4. Representative soil features

Parent material	(1) Alluvium – sandstone and shale (2) Alluvium – limestone and sandstone (3) Alluvium – quartzite
Surface texture	(1) Silty clay loam (2) Sandy loam (3) Loam
Family particle size	(1) Fine-loamy
Drainage class	Well drained
Permeability class	Moderately slow to moderate
Depth to restrictive layer	50 – 150 cm
Soil depth	50 – 150 cm
Surface fragment cover <=3"	0 – 10 %
Surface fragment cover >3"	0 – 10 %
Available water capacity (Depth not specified)	7.62 – 17.78 cm
Calcium carbonate equivalent (Depth not specified)	0 – 10 %
Electrical conductivity (Depth not specified)	0 – 10 mmhos/cm
Sodium adsorption ratio (Depth not specified)	0 – 10

Soil reaction (1:1 water) (Depth not specified)	7.4 – 8.4
Subsurface fragment volume <=3" (Depth not specified)	0 – 20 %
Subsurface fragment volume >3" (Depth not specified)	0 – 20 %

## Ecological dynamics

Wyoming sagebrush is typically the dominant shrub in this community phase. Where Utah juniper has invaded, Wyoming big sagebrush and other shrubs decline, otherwise they dominate the community. Winterfat is dead or dying. Remaining perennial herbaceous vegetation is mostly found only in protected locations under shrubs. Invasive, non-native grasses and weeds including cheatgrass, annual mustards, redstem storksbill, etc. dominate the understory.

## 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 (%)
<b>Shrub/Vine</b>					
0	<b>Dominant Shrubs</b>			180-275	
	Wyoming big sagebrush	ARTRW8	<i>Artemisia tridentata ssp. wyomingensis</i>	112-224	–
	winterfat	KRLA2	<i>Krascheninnikovia lanata</i>	34-90	–
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	22-67	–
3	<b>Sub-Dominant Shrubs</b>			110-290	
	Shrub (>.5m)	2SHRUB	<i>Shrub (&gt;.5m)</i>	39-78	–
	shadscale saltbush	ATCO	<i>Atriplex confertifolia</i>	6-28	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	6-28	–
	Nevada jointfir	EPNE	<i>Ephedra nevadensis</i>	6-28	–
	mormon tea	EPVI	<i>Ephedra viridis</i>	6-28	–
	rubber rabbitbrush	ERNA10	<i>Ericameria nauseosa</i>	6-28	–
	spiny hopsage	GRSP	<i>Grayia spinosa</i>	6-28	–
	broom snakeweed	GUSA2	<i>Gutierrezia sarothrae</i>	6-28	–
	plains pricklypear	OPPO	<i>Opuntia polyacantha</i>	6-28	–
	Nuttall's horsebrush	TENU2	<i>Tetradymia nuttallii</i>	6-28	–
<b>Grass/Grasslike</b>					
0	<b>Dominant Grasses</b>			196-353	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	73-135	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	39-90	–
	needle and thread	HECO26	<i>Hesperostipa comata</i>	39-90	–
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	39-90	–
1	<b>Sub-Dominant Grasses</b>			94-220	
	Grass, perennial	2GP	<i>Grass, perennial</i>	22-45	–

	saline wildrye	LESAS	<i>Leymus salinus ssp. salinus</i>	6-34	-
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	6-34	-
	sand dropseed	SPCR	<i>Sporobolus cryptandrus</i>	6-28	-
	purple threeawn	ARPU9	<i>Aristida purpurea</i>	6-28	-
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	6-28	-
<b>Forb</b>					
0	<b>Dominant Forbs</b>			8-39	
	scarlet globemallow	SPCO	<i>Sphaeralcea coccinea</i>	6-45	-
2	<b>Sub-Dominant Forbs</b>			67-224	
	Forb, perennial	2FP	<i>Forb, perennial</i>	34-67	-
	Forb, annual	2FA	<i>Forb, annual</i>	28-56	-
	littleleaf pussytoes	ANMI3	<i>Antennaria microphylla</i>	0-11	-
	woolly locoweed	ASMO7	<i>Astragalus mollissimus</i>	0-11	-
	sego lily	CANU3	<i>Calochortus nuttallii</i>	0-11	-
	twolobe larkspur	DENU2	<i>Delphinium nuttallianum</i>	0-11	-
	western tansymustard	DEPI	<i>Descurainia pinnata</i>	0-11	-
	cushion buckwheat	EROV	<i>Eriogonum ovalifolium</i>	0-11	-
	basin fleabane	ERPU9	<i>Erigeron pulcherrimus</i>	0-11	-
	manybranched ipomopsis	IPPO2	<i>Ipomopsis polycladon</i>	0-11	-
	Barneby's pepperweed	LEBA	<i>Lepidium barnebyanum</i>	0-11	-
	mountain pepperweed	LEMO2	<i>Lepidium montanum</i>	0-11	-
	Gray's biscuitroot	LOGR	<i>Lomatium grayi</i>	0-11	-
	whitestem blazingstar	MEAL6	<i>Mentzelia albicaulis</i>	0-11	-
	Lapoint beardtongue	PEGO2	<i>Penstemon goodrichii</i>	0-11	-
	longleaf phlox	PHLO2	<i>Phlox longifolia</i>	0-11	-
	hedgemustard	SIOF	<i>Sisymbrium officinale</i>	0-11	-

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 10. Community 2.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 11. Community 2.4 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 12. Community 2.5 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 13. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 14. Community 3.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 15. Community 4.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 16. Community 5.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 17. Community 5.2 plant community composition

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

This site provides proper grazing for sheep, cattle and horses all seasons of the year, but more particularly in the spring and fall. This site provides food and cover for wildlife. Wildlife using this site include jackrabbit, snake, coyote, mule deer, and hawk.

## Hydrological functions

The soil is in hydrologic groups b and c. The runoff curve numbers are 61 through 86 depending on the condition of the watershed.

## Recreational uses

This site has moderate recreational opportunities and often has scenic vistas.

## Wood products

Utah juniper and pinyon invade this site and may produce firewood or posts.

## Inventory data references

Galatowitsch, S.M. 1990. Using the original land survey notes to reconstruct pre-settlement landscapes in the American West. Great Basin Naturalist: 50(2): 181-191. Keywords: [Western U.S., conservation, history, human impact] Spangler, J.D. 1995. Paradigms and Perspectives: A Class I Overview of Cultural Resources in the Uintah Basin and Tavaputs Plateau. Contract No. 1422J910C4014. USDA-FS. 2006. Fire Effects Information System (FEIS). USDA-NRCS. 2003. National Range and Pasture Handbook, in USDA, editor, USDA-Natural Resources Conservation Service-Grazing Lands Technology Institute. Keywords: [Western US, Federal guidelines, Range pasture management] Watt, R.G. 1997. A History of Carbon County. Utah State Historical Society.

## Contributors

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## Approval

Kirt Walstad, 3/05/2022

## 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)	V. Keith Wadman (NRCS Retired).
Contact for lead author	shane.green@ut.usda.gov
Date	04/26/2012
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

1. **Number and extent of rills:** None to very few rills present. Some very minor rill development may occur on steeper slopes or on areas located below exposed bedrock or other water shedding areas where increased runoff may occur. Where these rills are present, they should be fairly short (3-6 feet), <1 inch deep and somewhat widely spaced (4-8 feet). Minor rill development may be observed on all slopes following major thunderstorm or spring runoff events but should heal during the next growing season.

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2. **Presence of water flow patterns:** Some very minor evidence of water flow patterns may be found around perennial plant bases. They show little evidence of current erosion. They are expected to be short (3-6 feet), stable, sinuous and not connected. There may be very minor evidence of deposition. Evidence of water flow may increase somewhat with slope.

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3. **Number and height of erosional pedestals or terracettes:** Perennial vegetation shows little evidence of erosional pedestalling (1 to 2% of individual plants). Plant roots are covered and litter remains in place around plant crowns. Terracettes should be absent or, if present, stable. A slight increase in both pedestal and terracette development may occur with increasing slope.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** 15-20% bare ground. Bare ground spaces should not be greater than 1 to 2 feet in diameter.

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5. **Number of gullies and erosion associated with gullies:** No gullies present on site. A very few gullies may be present in landscape settings where they transport runoff from areas of greater water flow such as exposed bedrock. These gullies will be limited to slopes exceeding 20% and adjacent to sites where this runoff accumulation occurs. Any gullies present should show little sign of accelerated erosion and should be stabilized with perennial vegetation.

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6. **Extent of wind scoured, blowouts and/or depositional areas:** None. No evidence of wind generated soil movement is present. Wind caused blowouts and deposition are not present.

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7. **Amount of litter movement (describe size and distance expected to travel):** Most litter resides in place with some redistribution caused by water movement. Minor litter removal may occur in flow channels with deposition occurring within 1 to 2 feet at points of obstruction. The majority of litter accumulates at the base of plants. Some grass leaves and small twigs (grass stems) may accumulate in soil depressions adjacent to plants. Woody stems are not likely to move. However, some litter movement is expected (up to 6 feet) with increases in slopes >15% and/or increased runoff resulting from heavy thunderstorms.

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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):** This site should have a soil stability rating of 5 or 6 under the plant canopies, and a rating of 4 to 5 in the interspaces. The average rating should be a 5. Soil surface textures are typically loams and silt loams.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** (Abracon) Soil surface 0-4 inches. Texture is a loam; color is brown (7.5YR 5/4) and structure is weak thin platy. Ochric epipedon ranges to 4 inches. Use the specific information for the soil you are assessing found in the published soil survey to supplement this description.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Perennial vegetation produces sufficient cover and spatial arrangement to intercept most raindrops and reduce raindrop splash erosion. Litter on soil surface and cryptogamic crusting, where present, also protects soil from splash erosion and encourages a higher rate of infiltration. Plant spatial distribution should slow runoff, allowing additional time for infiltration. Bare spaces are expected to be small (< 3 feet) and irregular in shape and are usually not connected. Vegetative structure is usually adequate to capture snow and ensure that snowmelt occurs in a controlled manner, allowing maximum time for infiltration, and reducing runoff and erosion in all but the most extreme storm events. When perennial grasses and shrubs decrease due to natural events including drought, insect damage, etc., which reduce ground cover and increase bare ground, runoff is expected to increase and associated infiltration reduced.

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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None. Some soils have a calcic horizon at 7 to 24 inches that could be mistaken for a compaction pan.

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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:** Non-sprouting shrubs (Wyoming big sagebrush, shadscale) > Perennial bunchgrasses (Indian ricegrass, bottlebrush squirreltail) > Forbs (Scarlet globemallow).

**Sub-dominant:** Sprouting shrubs (fourwing saltbush, winterfat) > Rhizomatous grasses (James galleta, blue grama) > Perennial forbs (woolly milkvetch).

**Other:** A wide variety of other perennial grasses and both perennial and annual forbs can be expected to occur in the plant community.

**Additional:** Natural disturbance regimes include fire, drought, and insects. Assumed fire cycle of 30 to 40+ years. Functional/structural groups may appropriately contain non-native species if their ecological function is the same as the native species in the reference state. Following a disturbance such as fire, drought, rodents or insects that remove woody vegetation, forbs and perennial grasses (herbaceous species) may dominate the community for a period of time. If a disturbance has not occurred for an extended period of time, woody species may continue to increase. These conditions would reflect functional community phases within the reference state.

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- 13. Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**  
All age classes of perennial grasses should be present under average to above average growing conditions with age class expression likely subdued during periods of extended drought. Slight decadence in the principle shrubs could occur near the end of the fire cycle or during periods of extended drought, or insect infestations. In general, a mix of age classes should be expected with some dead and decadent plants present.
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- 14. Average percent litter cover (%) and depth ( in):** Litter cover will be heavier under plants. Most litter will be herbaceous and depths of 1/2 to 1 inch would be considered normal. Perennial vegetation should be well distributed on the site.
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- 15. Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**  
Annual production in air-dry herbage should be approximately 650 - 700 #/acre on an average year but could range from 500 - 900 #/acre during periods of prolonged drought or above average precipitation.
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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, Russian thistle, Utah juniper, and non-native, invasive annual forbs.**
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- 17. Perennial plant reproductive capability:** All perennial plants should have the ability to reproduce in all years, except in extreme drought years. Green rabbitbrush sprouts vigorously following fire. There are no restrictions on either seed or vegetative reproduction. Some seedling recruitment of major species is present during average and above average growing years.
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