USDA Natural Resources
Conservation Service

Ecological site R034BY240UT
Semidesert Silt Loam (Winterfat)

Last updated: 3/05/2022
Accessed: 05/04/2024

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.

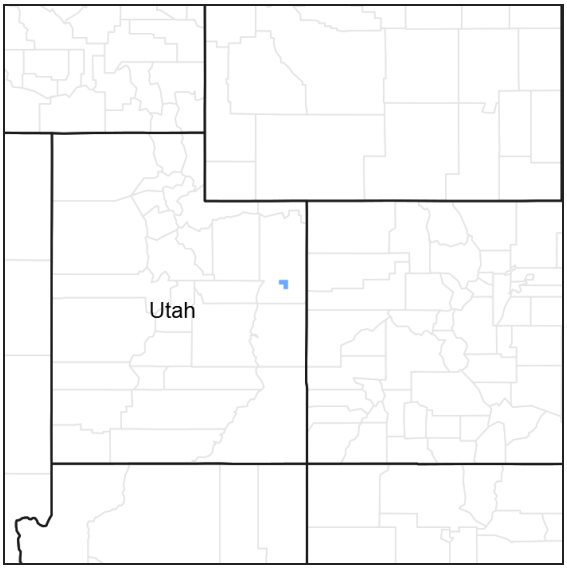


Figure 1. Mapped extent

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.

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

The soils of this site formed mostly in alluvium from sandstone, limestone and shale. Surface soils are silt loam in texture. Rock fragments may be present on the soil surface and throughout the profile, but make up less than 35 percent of the soil volume. These soils are deep to very deep, well-drained, and have moderately rapid permeability. pH is moderately alkaline. Available water-holding capacity ranges from 5.6 to 7.1 inches of water in the upper 60 inches of soil. The soil moisture regime is mostly ustic aridic and the soil temperature regime is mesic. Precipitation ranges from 8-12 inches annually.

Associated sites

R034BY212UT	**Semidesert Loam (Wyoming Big Sagebrush)** Semidesert Loam (Wyoming big sagebrush)
R034BY247UT	**Semidesert Stony Loam (Utah Juniper-Pinyon)** Semidesert Stony Loam (Utah juniper-Pinyon)

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Krascheninnikovia lanata*
Herbaceous	(1) *Achnatherum hymenoides*

Physiographic features

This site occurs on alluvial flats and drainage bottoms. Slopes are mostly 2 to 4 percent. Elevations range from 5,600 to 6,800 feet on all aspects.

Table 2. Representative physiographic features

Landforms	(1) Alluvial flat
Runoff class	Low
Flooding frequency	None
Ponding frequency	None
Elevation	1,707–2,073 m
Slope	2–4%

Ponding depth	Not specified
Water table depth	Not specified

Climatic features

Average annual precipitation is 8 to 12 inches. Approximately 65% 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 110 to 140 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)	
Precipitation total (characteristic range)	203-305 mm
Frost-free period (average)	
Freeze-free period (average)	140 days
Precipitation total (average)	

Influencing water features

None.

Soil features

The soils of this site formed mostly in alluvium from sandstone, limestone and shale. Surface soils are silt loam in texture. Rock fragments may be present on the soil surface and throughout the profile, but make up less than 35 percent of the soil volume. These soils are deep to very deep, well-drained, and have moderately rapid permeability. pH is moderately alkaline. Available water-holding capacity ranges from 5.6 to 7.1 inches of water in the upper 60 inches of soil. The soil moisture regime is mostly ustic aridic and the soil temperature regime is mesic. Precipitation ranges from 8-12 inches annually.

Modal Soil: Mikim SiL 2-4% Eroded — fine-loamy, mixed, calcareous, mesic Ustic Torriorthents

Table 4. Representative soil features

Parent material	(1) Alluvium–sandstone and shale (2) Alluvium–limestone
Surface texture	(1) Silt loam
Family particle size	(1) Fine-loamy
Drainage class	Well drained
Permeability class	Moderate
Depth to restrictive layer	0–152 cm
Soil depth	0–152 cm
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (Depth not specified)	14.22–18.03 cm

Calcium carbonate equivalent (Depth not specified)	5–10%
Electrical conductivity (Depth not specified)	0–2 mmhos/cm
Sodium adsorption ratio (Depth not specified)	0
Soil reaction (1:1 water) (Depth not specified)	7.9–8.4
Subsurface fragment volume <=3" (Depth not specified)	11%
Subsurface fragment volume >3" (Depth not specified)	0%

Ecological dynamics

Ecological Dynamics of the Site
As ecological condition deteriorates due to overgrazing, Indian ricegrass and squirreltail decrease while horsebrush, snakeweed, and shadscale increase.

When the potential natural plant community is burned, Indian ricegrass and shadscale decrease while horsebrush increase.

Cheatgrass, halogeton, and other annual forbs are most likely to invade this site.

State 1: Reference State
The Reference State 1.0 is a representative of the natural range of variability under pristine conditions. This state has two community phases, one co-dominated by shrubs and grass, and the other dominated by shrubs. State dynamics are maintained by interactions between climatic patterns and disturbance regimes. Negative feedbacks enhance ecosystem resilience and contribute to the stability of the state. These include the presence of all structural and functional groups, low fine fuel loads, and retention of organic matter and nutrients. This site is very stable, with little variation in plant community composition. Plant community changes would be reflected in production in response to drought or abusive grazing. Wet years will increase grass production, while drought years will reduce production. Shrub production will also increase during wet years; however, recruitment of winterfat is episodic.

Community Phase 1.1: Winterfat, Indian ricegrass
This community is dominated by winterfat and Indian ricegrass. Needle-and-thread and four-wing saltbush are also important species on this site. Community phase changes are primarily a function of chronic drought. Fire is infrequent and patchy due to low fuel loads.

Community Phase Pathway 1.1a
Long term drought and/or herbivory. Fires would also decrease vegetation on these sites but would be infrequent and patchy due to low fuel loads.

Community Phase 1.2: Winterfat
Drought will favor shrubs over perennial bunchgrasses. However, long-term drought will result in an overall decline in the plant community, regardless of functional group.

Community Phase Pathway 1.2a
Time, lack of disturbance and recovery from drought would allow the vegetation to increase and bare ground would eventually decrease.

Transition T1A
Trigger: This transition is caused by the introduction of non-native annual plants, such as halogeton and cheatgrass.

Slow variables: Over time the annual non-native species will increase within the community.
Threshold: Any amount of introduced non-native species causes an immediate decrease in the resilience of the site.

Annual non-native species cannot be easily removed from the system and have the potential to significantly alter disturbance regimes from their historic range of variation.

State 2: Current Potential State
This state is similar to the Reference State 1.0. This state has the same two general community phases. Ecological function has not changed, however the resiliency of the state has been reduced by the presence of invasive weeds. Non-natives may increase in abundance but will not become dominant within this State. These non-natives can be highly flammable and can promote fire where historically fire had been infrequent. Negative feedbacks enhance ecosystem resilience and contribute to the stability of the state. These feedbacks include the presence of all structural and functional groups, low fine fuel loads, and retention of organic matter and nutrients. Positive feedbacks decrease ecosystem resilience and stability of the state. These include the non-natives' high seed output, persistent seed bank, rapid growth rate, ability to cross pollinate, and adaptations for seed dispersal.

Community Phase 2.1: Winterfat, Indian ricegrass, annual non-natives
This community is dominated by winterfat and Indian ricegrass. Fourwing saltbushl and needle-and-thread are also important species on this site. Community phase changes are primarily a function of chronic drought. Fire is infrequent and patchy due to low fuel loads. Non-native annual species are present.

Community Phase Pathway 2.1a
Long term drought will favor shrubs over perennial bunchgrasses. However, long-term drought will result in an overall decline in the plant community, regardless of functional group. Inappropriate grazing will favor unpalatable shrubs such as shadscale, and cause a decline in winterfat.

Community Phase 2.2: Winterfat, annual non-natives
This community is dominated by winterfat. The perennial grass component is significantly reduced. This community phase is at-risk to move to state 3 or state 4.

Community Phase Pathway 2.2a
Release from long term drought and/or growing season grazing pressure allows recovery of bunchgrasses, and winterfat.

Transition T2A
Trigger: Inappropriate, long-term grazing of perennial bunchgrasses during the growing season and/or long term drought will favor shrubs and initiate a transition to Community phase 3.1.

Slow variables: Long term decrease in deep-rooted perennial grass density.

Threshold: Loss of deep-rooted perennial bunchgrasses changes nutrient cycling, nutrient redistribution, and reduces soil organic matter.

Transition T2B
Trigger: Severe fire/ multiple fires, long term inappropriate grazing and/or soil disturbing treatments such as plowing.

Slow variables: Increased production and cover of non-native annual species.
Threshold: Loss of deep-rooted perennial bunchgrasses and shrubs truncates, spatially and temporally, nutrient capture and cycling within the community. Increased, continuous fine fuels from annual non-native plants modify the fire regime by changing intensity, size and spatial variability of fires.

State 3: Shrub State
This state consists of one community phase. This site has crossed a biotic threshold and site processes are being controlled by shrubs. Bare ground has increased.

Community Phase 3.1: Winterfat, horsebrush, snakeweed, annual non-natives
Perennial bunchgrasses, like Indian ricegrass are reduced and the site is dominated by winterfat. Snakeweed and shadscale may be significant components or dominant shrubs. Annual nonnative species increase. Bare ground has increased.

Transition T3A
Trigger: Severe fire/ multiple fires, long term inappropriate grazing, and/or soil disturbing treatments such as plowing.

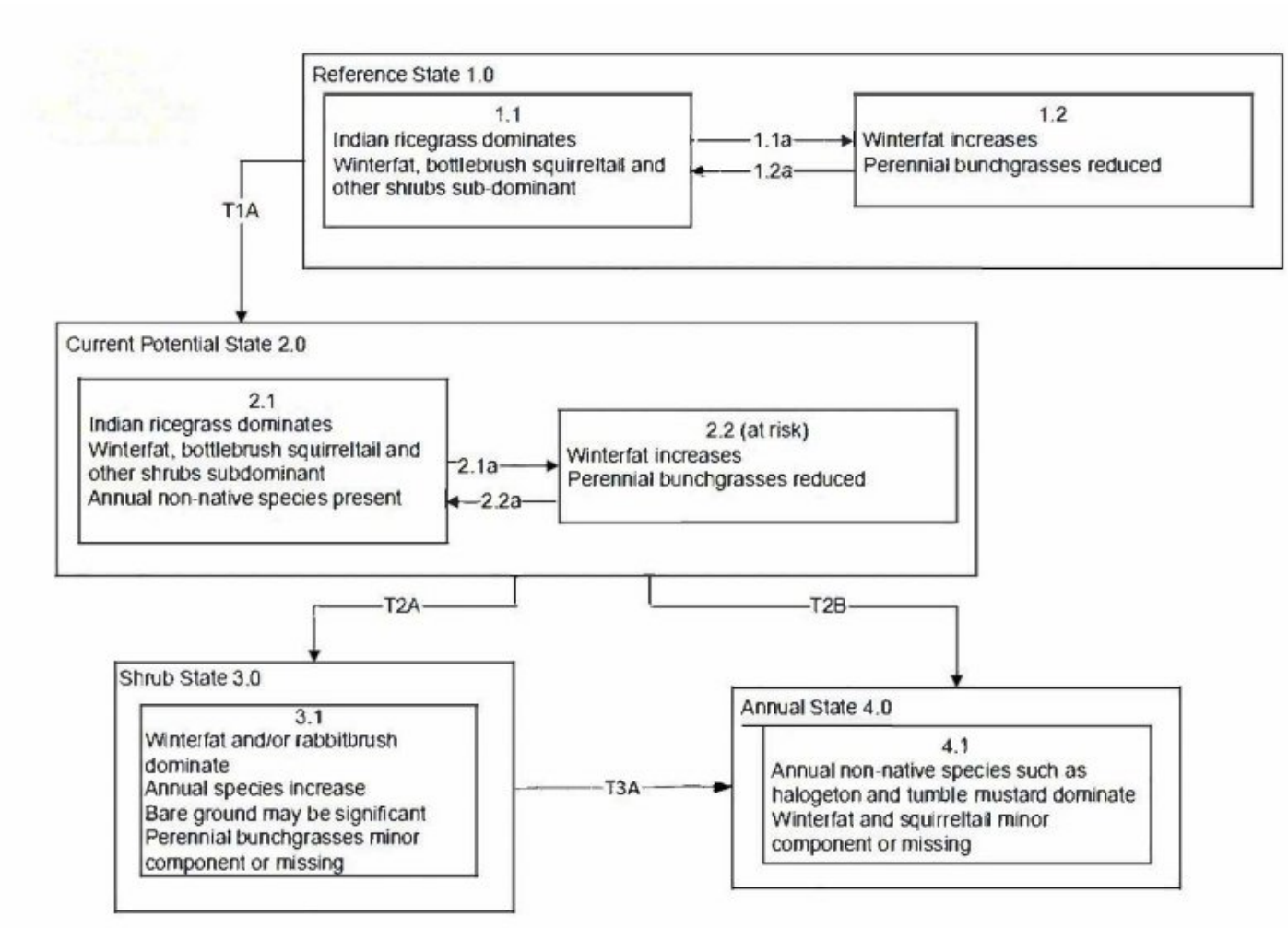
Slow variables: Increased production and cover of non-native annual species.

Threshold: Increased, continuous fine fuels modify the fire regime by changing intensity, size and spatial variability of fires. Changes in plant community composition and spatial variability of vegetation due to the loss of perennial bunchgrasses and shrubs truncate energy capture spatially and temporally thus impacting nutrient cycling and distribution.

State 4: Annual State
This state consists of one community phase. This community is characterized by the dominance of annual non-native species such as halogeton and cheatgrass. Shadscale, and other sprouting shrubs may dominate the overstory.

Community Phase 4.1: Annual non-natives
This community is dominated by annual non-native species. Trace amounts of winterfat and other shrubs may be present, but are not contributing to site function. Bare ground may be abundant, especially during low precipitation years. Soil erosion, soil temperature and wind are driving factors in site function.

State and transition model



Reference State 1.0 Community Phase Pathways
1.1a: Drought and/or excessive herbivory favors as decrease in perennial bunchgrasses. Fire was infrequent but would be patchy due to low fuel loads.
1.2a: Time and lack of disturbance and/or release from drought

Transition T1A: Introduction of non-native species such as cheatgrass and halogeton.

Current Potential State 2.0 Community Phase Pathways
2.1a: Drought and/or inappropriate grazing management
2.2a: Time and lack of disturbance and/or release from drought

Transition T2A: Inappropriate grazing management in the presence of non-native species (3.1)

Transition T2B: Catastrophic fire and/or multiple fires, inappropriate grazing management and/or soil disturbing treatments (4.1)

Transition T3A: Catastrophic fire and/or multiple fires, inappropriate grazing management and/or soil disturbing treatments (4.1)

State 1
Reference State

Community 1.1
Reference State

The dominant aspect of the plant community is winterfat. The composition by air-dry weight is approximately 30 percent perennial grasses, 10 percent forbs and 60 percent shrubs.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	285	397	520
Grass/Grasslike	143	194	261
Forb	48	54	87
Total	**476**	**645**	**868**

Table 6. Ground cover

Tree foliar cover	0%
Shrub/vine/liana foliar cover	35-45%
Grass/grasslike foliar cover	15-25%
Forb foliar cover	1-10%
Non-vascular plants	0%
Biological crusts	0%
Litter	0%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	0%

Table 7. Canopy structure (% cover)

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	–	–	–	–
>0.15 <= 0.3	–	–	–	1-10%
>0.3 <= 0.6	–	35-45%	15-25%	–
>0.6 <= 1.4	–	–	–	–
>1.4 <= 4	–	–	–	–
>4 <= 12	–	–	–	–
>12 <= 24	–	–	–	–
>24 <= 37	–	–	–	–
>37	–	–	–	–

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Shrub/Vine					
0	**Dominant Shrubs**			282–437	
	winterfat	KRLA2	*Krascheninnikovia lanata*	235–303	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	34–67	–
	Wyoming big sagebrush	ARTRW8	*Artemisia tridentata ssp. wyomingensis*	7–34	–
	bud sagebrush	PIDE4	*Picrothamnus desertorum*	7–34	–
3	**Sub-Dominant Shrubs**			54–101	
	Shrub (>.5m)	2SHRUB	*Shrub (>.5m)*	20–34	–
	prairie sagewort	ARFR4	*Artemisia frigida*	7–13	–
	shadscale saltbush	ATCO	*Atriplex confertifolia*	7–13	–
	broom snakeweed	GUSA2	*Gutierrezia sarothrae*	7–13	–
	greasewood	SAVE4	*Sarcobatus vermiculatus*	7–13	–
	shortspine horsebrush	TESP2	*Tetradymia spinosa*	7–13	–
Grass/Grasslike					
0	**Dominant Grasses**			108–202	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	67–101	–
	western wheatgrass	PASM	*Pascopyrum smithii*	34–67	–
	needle and thread	HECO26	*Hesperostipa comata*	7–34	–
1	**Sub-Domianant Grasses**			67–137	
	Grass, annual	2GA	*Grass, annual*	20–34	–
	Grass, perennial	2GP	*Grass, perennial*	20–34	–
	blue grama	BOGR2	*Bouteloua gracilis*	7–20	–
	squirreltail	ELEL5	*Elymus elymoides*	7–20	–
	Sandberg bluegrass	POSE	*Poa secunda*	7–20	–
	James' galleta	PLJA	*Pleuraphis jamesii*	7–9	–
Forb					
0	**Dominant Forbs**			20–34	
	scarlet globemallow	SPCO	*Sphaeralcea coccinea*	20–34	–
2	**Sub-Dominant Forbs**			67–148	
	Forb, annual	2FA	*Forb, annual*	20–34	–
	Forb, perennial	2FP	*Forb, perennial*	20–34	–
	Fendler's sandmat	CHFE3	*Chamaesyce fendleri*	7–20	–
	western tansymustard	DEPI	*Descurainia pinnata*	7–20	–
	flatspine stickseed	LAOC3	*Lappula occidentalis*	7–20	–
	mountain pepperweed	LEMO2	*Lepidium montanum*	7–20	–

Animal community

This site provides proper grazing for sheep and cattle during fall, winter, and spring.
This site provides food and limited cover for wildlife. Wildlife using this site include jackrabbit, snake, lizard, coyote, and hawk.

Hydrological functions

The soil is in hydrologic group b. The runoff curve numbers are 61 through 79 depending on the condition of the watershed.

Recreational uses

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

Wood products

None

Contributors

J. Lee Broadbent
Garth Leishman

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	04/16/2012
Approved by	Kirt Walstad
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None to Very Rare. Very minor rill development may be evident following significant thunderstorm or snow melt events. The presence of rills may also be more apparent where run-on from adjacent upland sites or exposed bedrock concentrate flows. Any rill development present should be less than 1 inch deep, moderately short (< 5') and spaced 8 to 10 feet apart.

---

2. **Presence of water flow patterns:** A few stable overland flow patterns wind around plant bases but show no evidence of current deposition. Flow patterns are normally 15 to 20 feet long, follow natural contours, and are typically spaced at least 10 to 15 feet apart. A slight increased flow activity may be observed immediately following significant weather events such as thunderstorms or spring run-off events.

---

3. **Number and height of erosional pedestals or terracettes:** None. There should be no evidence of pedestals or terracettes caused by accelerated water erosion. One to 2 inches of elevational mounding under winterfat and four-wing saltbush canopies, and within biological soil crusts, is normal for this site and is not be caused by water erosion. There are no exposed roots around perennial grasses and shrubs.

---

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground ranges from 50% - 60%. Bare ground openings should not be greater than 2 to 3 feet in diameter and should not be connected.

---

5. **Number of gullies and erosion associated with gullies:** None at site level. Scattered landscape level gully channels, however, are a normal component of desert environments. Where landscape gullies are present, they should be stable, partially vegetated on their sides and bottoms, with no evidence of head-cutting. Some slight increase on disturbance may be evident following significant weather events or when gullies convey considerable runoff from higher elevation rocky or naturally eroding areas.

---

6. **Extent of wind scoured, blowouts and/or depositional areas:** Very minor evidence of wind generated soil movement may be present. Slight depositional mounding within perennial grass crowns, under winterfat and four-wing saltbush canopies, and within biological soil crusts is normal fof this site.

---

7. **Amount of litter movement (describe size and distance expected to travel):** The majority of litter accumulates in place at the base of plants canopies. Slight movement of the finest material (< 1/8 inch) may move 1 to 2 feet in the direction of prevailing winds or down slope if being transported by water. Little accumulation is observed behind obstructions.

---

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 4 or 5 under plant canopies, and a 3 to 5 in the interspaces. Average should be a 4. Surface textures are typically silt loams and loams containing very few coarse fragments.

---

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** (Mikim) Soil surface is typically 0 to 3 inches deep. Texture is a loam and structure is strong medium platy. The A-horizon color is brown (10YR 4/3). Soils have an Ochric epipedon that extends 9 inches into the soil profile. The A horizon is normally deeper and better developed under plant canopies.

---

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Healthy stands of perennial grasses and shrubs, as well as the presents of biological crusts, provide for good infiltration, help break raindrop impact, and reduce runoff from storm events. Bare spaces are expected to be fairly small (< 3 feet) should be irregular in shape and usually not connected. Vegetative structure is adequate to capture snow and and allow snowmelt to occur in a controlled manner.

---

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None. Soils are deep to very deep. An increase in clay content within the soil

profile should not be mistaken for a compaction layer.

---

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: Sprouting shrubs (winterfat, four-wing saltbush >> Perennial bunchgrasses (Indian ricegrass, bottlebrush squirreltail) > Perennial forbs (scarlet globemallow).

    Sub-dominant: Non-sprouting shrubs (bud sage, shadscale) > Rhizomatous grasses (Western wheatgrass) > = Warm season grasses (James galleta, blue grama).

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

    Additional: Moss and lichen communities will normally be found under plant canopies while the cyanobacteria may be found throughout the site. Functional/structural groups may appropriately contain non-native species if their ecological function is the same as the native species. Perennial and annual forbs can be expected to vary widely in their expression in the plant community based upon departures from average growing conditions.

---

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 during years with average to above-average precipitation, there should be very little recent mortality or decadence apparent in either the shrubs or grasses. During severe (multi-year) drought or insect infestations up to 20% of the winterfat may die. There may be partial mortality of individual bunchgrasses and other shrubs during severe drought.

---

14. **Average percent litter cover (%) and depth (in):** Litter cover ranges from 10 to 20% with a spike when Bud Sage drops its leaves. Depth should be 0 to 1 leaf thickness in the interspaces and from ½ - ¾ inches under perennial plant canopies.

---

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 550 to 600 pounds per acre on an average year. Production could vary from 400 to 800 pounds per acre during drought or above-average years.

---

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:** Russian thistle, annual bromes and halogeton are most likely to invade this site.

---

17. **Perennial plant reproductive capability:** All perennial plant species have the ability to reproduce in most years except drought years. There are no restrictions on either seed or vegetative reproduction. Some seedling recruitment of major species may be present during average or above average years.
