

## **Ecological site R026XY030NV LOAMY BOTTOM 8-12 P.Z.**

Last updated: 4/10/2024  
Accessed: 05/04/2024

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### **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): 026X—Carson Basin and Mountains

The area lies within western Nevada and eastern California, with about 69 percent being within Nevada, and 31 percent being within California. Almost all this area is in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus. Isolated north-south trending mountain ranges are separated by aggraded desert plains. The mountains are uplifted fault blocks with steep side slopes. Most of the valleys are drained by three major rivers flowing east across this MLRA. A narrow strip along the western border of the area is in the Sierra Nevada Section of the Cascade-Sierra Mountains Province of the Pacific Mountain System. The Sierra Nevada Mountains are primarily a large fault block that has been uplifted with a dominant tilt to the west. This structure leaves an impressive wall of mountains directly west of this area. This helps create a rain shadow affect to MLRA 26. Parts of this eastern face, but mostly just the foothills, mark the western boundary of this area. Elevations range from about 3,806 feet (1,160 meters) on the west shore of Pyramid Lake to 11,653 feet (3,552 meters) on the summit of Mount Patterson in the Sweetwater Mountains.

Valley areas are dominantly composed of Quaternary alluvial deposits with Quaternary playa or alluvial flat deposits often occupying the lowest valley bottoms in the internally drained valleys, and river deposited alluvium being dominant in externally drained valleys. Hills and mountains are dominantly Tertiary andesitic flows, breccias, ash flow tuffs, rhyolite tuffs or granodioritic rocks. Quaternary basalt flows are present in lesser amounts, and Jurassic and Triassic limestone and shale, and Precambrian limestone and dolomite are also present in very limited amounts. Also of limited extent are glacial till deposits along the east flank of the Sierra Nevada Mountains, the result of alpine glaciation.

The average annual precipitation in this area is 5 to 36 inches (125 to 915 millimeters), increasing with elevation. Most of the rainfall occurs as high-intensity, convective storms in spring and autumn. Precipitation is mostly snow in winter. Summers are dry. The average annual temperature is 37 to 54 degrees F (3 to 12 degrees C). The freeze-free period averages 115 days and ranges from 40 to 195 days, decreasing in length with elevation.

The dominant soil orders in this MLRA are Aridisols and Mollisols. The soils in the area dominantly have a mesic soil temperature regime, an aridic or xeric soil moisture regime, and mixed or smectitic mineralogy. They generally are well drained, are clayey or loamy and commonly skeletal, and are very shallow to moderately deep.

This area supports shrub-grass vegetation characterized by big sagebrush. Low sagebrush and Lahontan sagebrush occur on some soils. Antelope bitterbrush, squirreltail, desert needlegrass, Thurber needlegrass, and Indian ricegrass are important associated plants. Green ephedra, Sandberg bluegrass, Anderson peachbrush, and several forb species also are common. Juniper-pinyon woodland is typical on mountain slopes. Jeffrey pine, lodgepole pine, white fir, and manzanita grow on the highest mountain slopes. Shadscale is the typical plant in the drier parts of the area. Sedges, rushes, and moisture-loving grasses grow on the wettest parts of the wet flood plains and terraces. Basin wildrye, alkali sacaton, saltgrass, buffaloberry, black greasewood, and rubber rabbitbrush grow on the drier sites that have a high concentration of salts.

Some of the major wildlife species in this area are mule deer, coyote, beaver, muskrat, jackrabbit, cottontail, raptors, pheasant, chukar, blue grouse, mountain quail, and mourning dove. The species of fish in the area include trout and catfish. The Lahontan cutthroat trout in the Truckee River is a threatened and endangered species.

## LRU notes

The "XY" LRU contains all the sites that cross other LRU boundaries. The sites are typically found along waterways.

## Ecological site concept

This site occurs on axial-stream floodplains, drainageways, and stream terraces. Slope gradients of 0 to 8 percent are typical. Elevations are 4100 to 6300 feet. The soils associated with this site are very deep and somewhat poorly drained to moderately well drained. Available water capacity is high. A seasonal water table fluctuates between 36 inches in spring to over 72 inches during drier periods. These soils are subject to flooding on an average of at least one year in three. The dominant plants are basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) and basin wildrye (*Leymus cinereus*).

## Associated sites

R026XY004NV	<b>SALINE BOTTOM</b>
R026XY012NV	<b>DRY FLOODPLAIN 8-10 P.Z.</b>
R026XY001NV	<b>MOIST FLOODPLAIN</b>

## Similar sites

R026XY057NV	<b>LOAMY BOTTOM 14+ P.Z.</b> ARTRV dominant shrub; less productive site
R026XY004NV	<b>SALINE BOTTOM</b> ARTR2 rare to absent; less productive site
R026XY001NV	<b>MOIST FLOODPLAIN</b> LETR5 codominant grass
R026XY032NV	<b>DEEP SODIC FAN</b> ATCA2-ATTO codominant; less productive site
R026XY012NV	<b>DRY FLOODPLAIN 8-10 P.Z.</b> Less productive site

**Table 1. Dominant plant species**

Tree	Not specified
Shrub	(1) <i>Artemisia tridentata</i> ssp. <i>tridentata</i>
Herbaceous	(1) <i>Leymus cinereus</i>

## Physiographic features

This site occurs on axial-stream floodplains, drainageways, and stream terraces. Slope gradients of 2 to 8 percent are typical. Elevations are 4100 to 6300 feet.

**Table 2. Representative physiographic features**

Landforms	(1) Flood plain (2) Stream terrace (3) Drainageway
Runoff class	Very low to high
Flooding duration	Brief (2 to 7 days) to very brief (4 to 48 hours)

Flooding frequency	Rare to occasional
Ponding frequency	None
Elevation	4,100–6,300 ft
Slope	2–8%
Water table depth	36–72 in
Aspect	Aspect is not a significant factor

## Climatic features

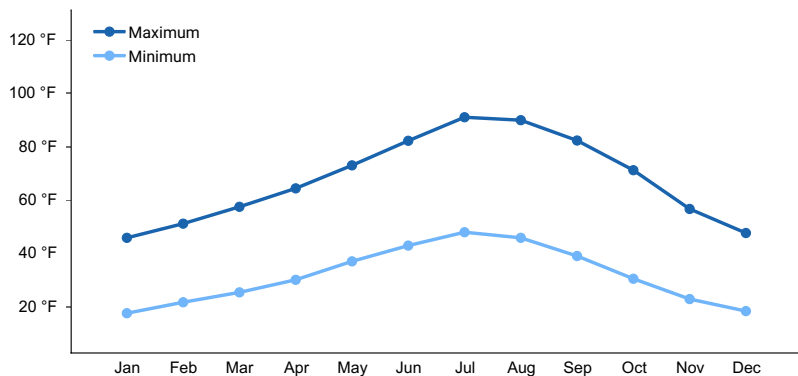
The climate associated with this site is semiarid, characterized by cool, moist winters and warm, dry summers. Average annual precipitation is 8 to 12 inches. Mean annual air temperature is 40 to 52 degrees F. The average growing season is about 60 to 130 days.

Nevada's climate is predominantly arid, with large daily ranges of temperature, infrequent severe storms, heavy snowfall in the higher mountains, and great location variations with elevation. Three basic geographical factors largely influence Nevada's climate: continentality, latitude, and elevation. Continentality is the most important factor. The strong continental effect is expressed in the form of both dryness and large temperature variations. Nevada lies on the eastern, lee side of the Sierra Nevada Range, a massive mountain barrier that markedly influences the climate of the State. The prevailing winds are from the west, and as the warm moist air from the Pacific Ocean ascend the western slopes of the Sierra Range, the air cools, condensation occurs and most of the moisture falls as precipitation. As the air descends the eastern slope, it is warmed by compression, and very little precipitation occurs. The effects of this mountain barrier are felt not only in the West but throughout the state, with the result that the lowlands of Nevada are largely desert or steppes. The temperature regime is also affected by the blocking of the inland-moving maritime air. Nevada sheltered from maritime winds, has a continental climate with well-developed seasons and the terrain responds quickly to changes in solar heating.

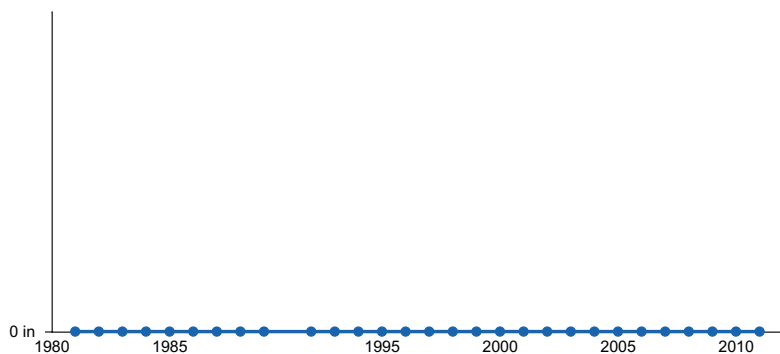
Nevada lies within the mid-latitude belt of prevailing westerly winds which occur most of the year. These winds bring frequent changes in weather during the late fall, winter and spring months, when most of the precipitation occurs. To the south of the mid-latitude westerlies, lies a zone of high pressure in subtropical latitudes, with a center over the Pacific Ocean. In the summer, this high-pressure belt shifts northward over the latitudes of Nevada, blocking storms from the ocean. The resulting weather is mostly clear and dry during the summer and early fall, with scattered thundershowers. The eastern portion of the state receives significant summer thunderstorms generated from monsoonal moisture pushed up from the Gulf of California, known as the North American monsoon. The monsoon system peaks in August and by October the monsoon high over the Western U.S. begins to weaken and the precipitation retreats southward towards the tropics (NOAA 2004).

**Table 3. Representative climatic features**

Frost-free period (characteristic range)	
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	8-12 in
Frost-free period (average)	95 days
Freeze-free period (average)	
Precipitation total (average)	10 in



**Figure 1. Monthly average minimum and maximum temperature**



**Figure 2. Annual precipitation pattern**

## Influencing water features

This site is associated with streams and may receive additional moisture during spring runoff and convective summer storms.

## Soil features

The soils associated with this site are very deep and poorly drained to moderately well drained. Available water capacity is high. A seasonal water table fluctuates between 36 inches in spring to over 72 inches during drier periods. These soils are subject to flooding on an average of at least one year in three. Deep rooted plants are able to utilize moisture from the water table and capillary fringe. Runoff is low to high on this site. Soil series associated with this site are Settlemeier, Smocreek and Voltaire.

**Table 4. Representative soil features**

Parent material	(1) Alluvium
Surface texture	(1) Loam (2) Silty clay
Family particle size	(1) Loamy
Drainage class	Poorly drained to moderately well drained
Permeability class	Moderately slow to moderate
Soil depth	72 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-40in)	5.9–7.5 in

Calcium carbonate equivalent (0-40in)	0–15%
Electrical conductivity (0-40in)	0–8 mmhos/cm
Sodium adsorption ratio (0-40in)	0–30
Soil reaction (1:1 water) (0-40in)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	0%
Subsurface fragment volume >3" (Depth not specified)	0%

## Ecological dynamics

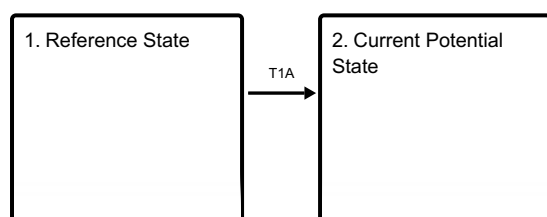
As ecological condition declines, basin big sagebrush and rabbitbrush become dominant as basin wildrye decreases in the plant community. Species most likely to invade this site are annuals.

### Fire Ecology:

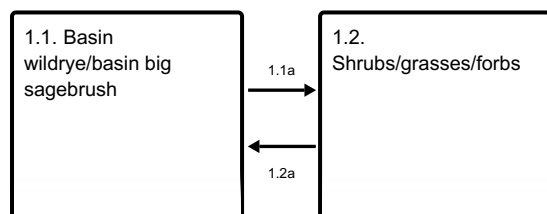
Fire return intervals in basin big sagebrush are intermediate between mountain big sagebrush (5 to 15 years) and Wyoming big sagebrush (10 to 70 years). A naturally wide variation in fire frequency in this system is expected. Big sagebrush is readily killed when aboveground plant parts are charred by fire. If sagebrush foliage is exposed to temperature above 195 degrees Fahrenheit for longer than 30 seconds, the plant dies. Prolific seed production from nearby unburned plants coupled with high germination rates enables seedlings to establish rapidly following fire. Basin wildrye is top-killed by fire. Older basin wildrye plants with large proportions of dead material within the perennial crown can be expected to show higher mortality due to fire than younger plants having little debris. Basin wildrye is generally tolerant of fire but may be damaged by early season fire combined with dry soil conditions.

## State and transition model

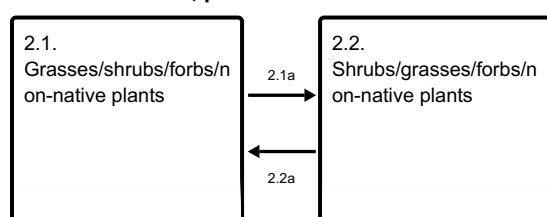
### Ecosystem states



### State 1 submodel, plant communities



### State 2 submodel, plant communities



## State 1 Reference State

The Reference State contains plant communities presumed to occur prior to the introduction of non-native plants, livestock grazing, and other modern disturbances. Disturbance regimes resemble those described above in the ecological dynamics section.

## **Community 1.1**

### **Basin wildrye/basin big sagebrush**

The reference plant community is dominated by basin wildrye and basin big sagebrush. Potential vegetative composition is about 75% grasses and grass-like plants, 10% forbs and 15% shrubs. Approximate ground cover (basal and crown) is 15 to 25 percent.

**Table 5. Annual production by plant type**

<b>Plant Type</b>	<b>Low (Lb/Acre)</b>	<b>Representative Value (Lb/Acre)</b>	<b>High (Lb/Acre)</b>
Grass/Grasslike	2625	3750	6000
Shrub/Vine	525	750	1200
Forb	350	500	800
<b>Total</b>	<b>3500</b>	<b>5000</b>	<b>8000</b>

## **Community 1.2**

### **Shrubs/grasses/forbs**

Phase 1.2 is 35 to 50 percent grasses, 5 to 15 percent forbs, and 40 to 50 percent shrubs. Basin big sagebrush becomes the dominant shrub, though rabbitbrush and greasewood may also be present. This phase occurs 25 to 60 years after fire or an extended wet period. Nutrients have a patchy distribution in the system associated with shrub islands of fertility.

## **Pathway 1.1a**

### **Community 1.1 to 1.2**

Community pathway 1.2a represents natural succession without fire or extended wet periods. This pathway usually occurs gradually as sagebrush increases in dominance, out-competing other species for resources. Nutrients are increasingly tied up in wood.

## **Pathway 1.2a**

### **Community 1.2 to 1.1**

Community pathway 1.2b is the result of fire or a wet period severe enough to kill shrubs. Perennial grasses and forbs increase in vigor following fire and less so following extended wet periods.

## **State 2**

### **Current Potential State**

The Current Potential State functions comparably to the Reference State, although non-native plant species are present in the community. Under proper management, the current potential state maintains the ecological processes and community phases that were present in the Reference State.

## **Community 2.1**

### **Grasses/shrubs/forbs/non-native plants**

Phase 2.1 is 85 to 95 percent grasses, 5 to 20 percent forbs, and 0 to 5 percent shrubs. Basin wildrye, western wheatgrass, and native forbs re-grow vigorously shortly after a fire by taking advantage of the resulting nutrient pulse. This phase can also result from extended wet periods that negatively impact shrubs. Non-native species are present, but not dominant.

**Community 2.2**  
**Shrubs/grasses/forbs/non-native plants**

Phase 2.2 is 35 to 50 percent grasses, 5 to 15 percent forbs, and 40 to 50 percent shrubs. Basin big sagebrush becomes the dominant shrub, though rabbitbrush and greasewood may also be present. This phase occurs 25 to 60 years after fire or an extended wet period. Nutrients have a patchy distribution in the system associated with shrub islands of fertility. Non-native species are present, but are not dominant.

**Pathway 2.1a**  
**Community 2.1 to 2.2**

Community pathway 2.1a represents natural succession without fire or extended wet periods. This pathway usually occurs gradually as sagebrush increases in dominance, out-competing other species for resources. Nutrients are increasingly tied up in wood.

**Pathway 2.2a**  
**Community 2.2 to 2.1**

Community pathway 2.2a is the result of fire or wet period severe enough to kill shrubs. Perennial grasses and forbs increase in vigor following fire and less so following extended wet periods.

**Transition T1A**  
**State 1 to 2**

Transition T1a represents the introduction of non-native plant species associated with European settlement. This transition is irreversible since eradication of non-native species would require costly management inputs; however, this transition results in minimal functional change.

**Additional community tables**

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1	<b>Primary Perennial Grasses</b>			3350–5000	
	basin wildrye	LECI4	<i>Leymus cinereus</i>	3000–3750	–
	sedge	CAREX	<i>Carex</i>	100–750	–
2	<b>Secondary Perennial Grasses</b>			100–400	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	25–100	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	25–100	–
	thickspike wheatgrass	ELLAL	<i>Elymus lanceolatus ssp. lanceolatus</i>	25–100	–
	beardless wildrye	LETR5	<i>Leymus triticoides</i>	25–100	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	25–100	–
<b>Forb</b>					
3	<b>Perennial</b>			100–400	
	beardless wildrye	LETR5	<i>Leymus triticoides</i>	25–100	–
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	25–100	–
4	<b>Annual</b>			50–150	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	25–100	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	25–100	–
<b>Shrub/Vine</b>					
5	<b>Primary Shrubs</b>			250–750	
	basin big sagebrush	ARTRT	<i>Artemisia tridentata ssp. tridentata</i>	250–750	–
6	<b>Secondary Shrubs</b>			100–250	
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	50–100	–
	rubber rabbitbrush	ERNA10	<i>Ericameria nauseosa</i>	50–100	–
	currant	RIBES	<i>Ribes</i>	50–100	–

## Animal community

### Livestock Interpretations:

This site is suited for livestock grazing. Grazing management should be keyed to basin wildrye production. Nevada bluegrass and sedge are other important forage species. The early growth and abundant production of basin wildrye make it a valuable source of forage for livestock. It is important forage for cattle and is readily grazed by cattle and horses in early spring and fall. Though coarse-textured during the winter, basin wildrye may be utilized more frequently by livestock and wildlife when snow has covered low shrubs and other grasses.

Stocking rates vary over time depending upon season of use, climate variations, site, and previous and current management goals. A safe starting stocking rate is an estimated stocking rate that is fine tuned by the client by adaptive management through the year and from year to year.

### Wildlife Interpretations:

Basin big sagebrush is browsed by mule deer from fall to early spring, but is not preferred. Basin big sagebrush is the least palatable of all the subspecies of big sagebrush. Basin wildrye provides winter forage for mule deer, though use is often low compared to other native grasses. Basin wildrye provides summer forage for black-tailed jackrabbits. Because basin wildrye remains green throughout early summer, it remains available for small mammal forage for longer time than other grasses.

## Hydrological functions

Runoff is low to high. Permeability is moderately slow to slow.



## Recreational uses

This has potential for upland and big game hunting and photography.

## Other products

Some Native American peoples used the bark of big sagebrush to make rope and baskets.

Basin wildrye was used as bedding for various Native American ceremonies, providing a cool place for dancers to stand.

## Other information

Basin big sagebrush shows high potential for range restoration and soil stabilization. Basin big sagebrush grows rapidly and spreads readily from seed.

Basin wildrye is useful in mine reclamation, fire rehabilitation and stabilizing disturbed areas. Its usefulness in range seeding, however, may be limited by initially weak stand establishment.

## Inventory data references

NASIS data for soil survey areas NV625, NV628, NV629, NV772, and NV773.

## Type locality

Location 1: Carson City County, NV	
General legal description	This site also occurs in Douglas, Lyon, Mineral, Storey and Washoe Counties, Nevada.

## Other references

Fire Effects Information System (Online; <http://www.fs.fed.us/database/feis/plants/>).

USDA-NRCS Plants Database (Online; <http://www.plants.usda.gov>).

## Contributors

DK/FR/GKB

## Approval

Kendra Moseley, 4/10/2024

## 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)	P NOVAK-ECHENIQUE
Contact for lead author	State Rangeland Management Specialist
Date	07/12/2012
Approved by	Kendra Moseley
Approval date	

## Indicators

1. **Number and extent of rills:** None

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2. **Presence of water flow patterns:** None

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3. **Number and height of erosional pedestals or terracettes:** None

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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  $\pm$  20%

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5. **Number of gullies and erosion associated with gullies:** None

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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):** Fine litter (foliage of grasses and annual & perennial forbs) only expected to move during periods of flooding by adjacent streams. Persistent litter (large woody material) will remain in place except during large flooding events.

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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):** Soil stability values will range from 4 to 6. (To be field tested.)

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Soil surface structure is platy, subangular blocky or granular. Soil surface colors are dark browns or grays and the soils have thick mollic epipedons. Organic matter can range from 2 to 3 percent for much of the upper 20 inches.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Deep-rooted, perennial, bunchgrasses slow runoff and increase infiltration. Tall stature and relatively coarse foliage of basin wildrye and associated litter break raindrop impact and provide opportunity for snow catch and snow accumulation on site.

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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 – Massive subsurface horizons are not to be interpreted as compaction.

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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: Tall-statured, deep-rooted, cool season, perennial bunchgrasses

Sub-dominant: >> relatively short-statured, deep-rooted, cool season, perennial bunchgrasses > tall shrubs > rhizomatous, cool season, perennial grasses > deep-rooted cool season perennial forbs > cool season, perennial grass-like plants > fibrous, shallow-rooted, cool season, annual and perennial forbs.

Other:

Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Dead leaf material is abundant in older basin wildrye plants. Shrubs may also display decadence with up to 30% of the canopy.
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14. **Average percent litter cover (%) and depth ( in):** Between plant interspaces ( $\pm 80\%$ ) and litter depth is  $\pm 1$  inch.
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season (through June)  $\pm 5000$  lbs/ac; Favorable years 8000 lbs/ac and unfavorable years 3500 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:** Potential invaders include annual mustards, thistle, annual kochia, pigweed, tall whitetop and salt cedar.
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17. **Perennial plant reproductive capability:** All functional groups should reproduce in most years.
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