

## **Ecological site R026XF613CA Rocky Upland Loam (BLM)**

Last updated: 4/10/2024  
Accessed: 04/25/2024

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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 Mono-Adobe-Long Valleys LRU is comprised of the basins surrounding Mono Lake, Adobe Valley, and Long Valley to the southeast. Pleistocene and Holocene age alluvium and lacustrine deposits predominate. Ash layers occur from eruptions of the numerous volcanic domes that are mostly in adjacent LRUs. Soil temperature regimes are mesic and soil moisture regimes are aridic. Elevations range from 1310 to 2680 meters and slopes are typically less than 10 percent, however there are some ecological sites within the Mono-Adobe-Long Valleys LRU that are greater than 10 percent. Frost free days (FFD) range from 97-125.

## Ecological site concept

The Rocky Upland Loam (BLM) is found on hills and mountains on slopes less than 50 percent. The elevation ranges from 7000 to 8500 feet. The soil is very shallow to bedrock and well drained. The dominant plant is singleleaf pinyon (*Pinus monophylla*).

## Similar sites

R026XF042CA	<b>Steep Rocky Loam (BLM)</b> The Steep Rocky Loam (BLM) site is found lower on the landscape and is dominated by shrubs, not trees.
F026XY060NV	<b>Shallow Loamy Slopes 12-16 P.Z PIMO/ARTRV/ACTH7</b> Similar site developed in Nevada.

Table 1. Dominant plant species

Tree	(1) <i>Pinus monophylla</i>
Shrub	Not specified
Herbaceous	Not specified

## Physiographic features

The Rocky Upland Loam (BLM) is found on hills and mountains on slopes less than 50 percent. The elevation ranges from 7000 to 8500 feet.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Mountain
Runoff class	Very high
Elevation	7,000–8,500 ft
Slope	0–50%
Aspect	Aspect is not a significant factor

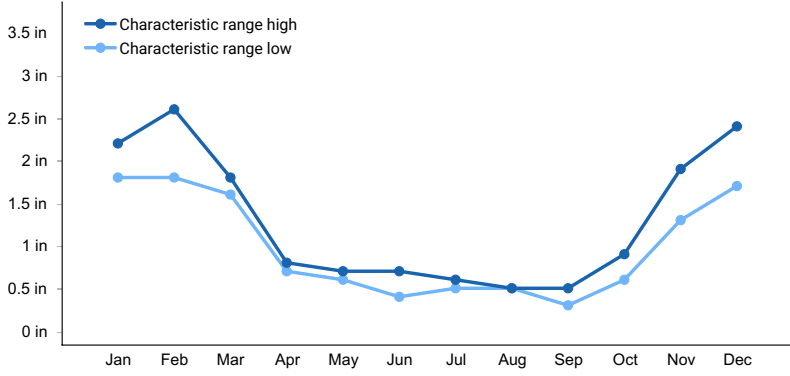
## Climatic features

The climate on this site is characterized by cold winters (20 to 40 degrees F) and warm, mostly dry summers (45 to 85 degrees F). The average annual precipitation ranges from 8 to 12 inches, with most falling as snow from November to March.

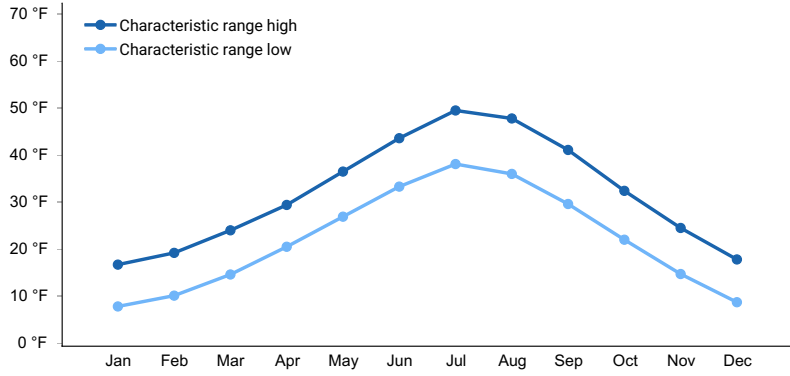
Table 3. Representative climatic features

Frost-free period (characteristic range)	
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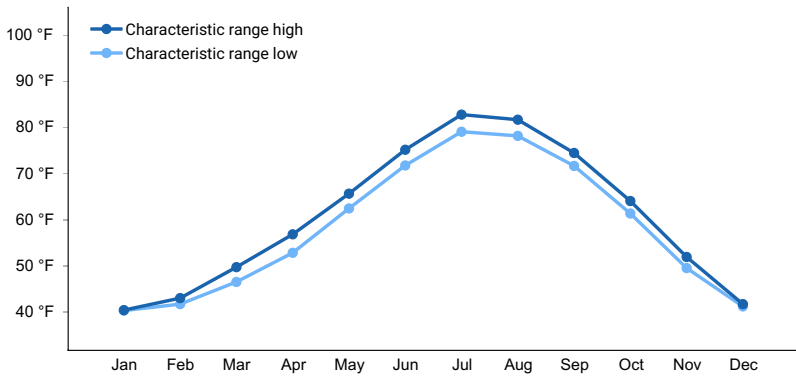
Freeze-free period (characteristic range)	
Precipitation total (characteristic range)	8-12 in
Frost-free period (average)	54 days
Freeze-free period (average)	68 days
Precipitation total (average)	12 in



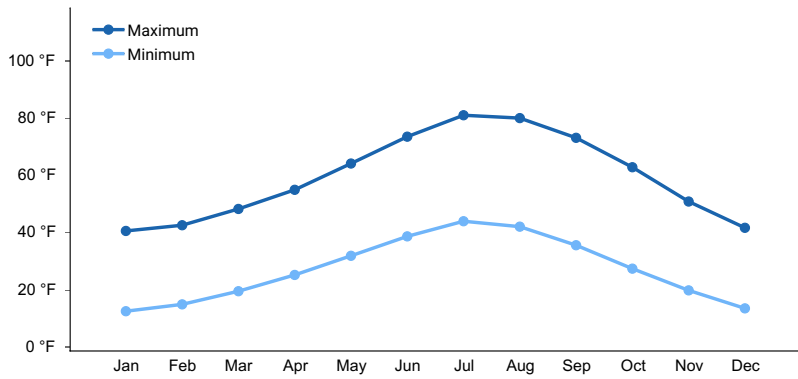
**Figure 1. Monthly precipitation range**



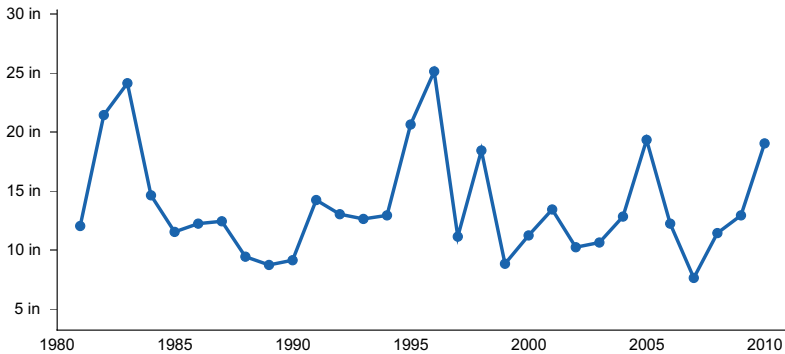
**Figure 2. Monthly minimum temperature range**



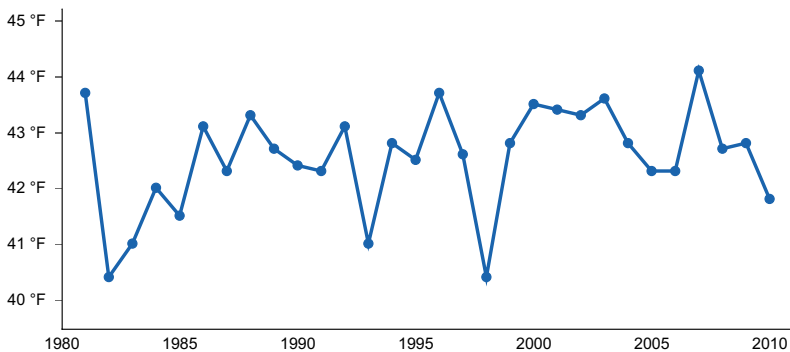
**Figure 3. Monthly maximum temperature range**



**Figure 4. Monthly average minimum and maximum temperature**



**Figure 5. Annual precipitation pattern**



**Figure 6. Annual average temperature pattern**

### Climate stations used

- (1) LEE VINING [USC00044881], Lee Vining, CA
- (2) BODIE CA ST HISTORIC PARK [USC00040943], Bridgeport, CA

### Influencing water features

The Rocky Upland Loam (BLM) is not influenced by water features.

### Soil features

The soil is very shallow to bedrock and well drained. The soil was formed in residuum weathered from metasedimentary rock, sometimes with inclusions of surficial volcanic ash over colluvium or residuum from basalt. The surface texture is very gravelly loamy sand or very stony sandy loam. The water availability is low. Rocks on the soil surface are over 20 percent cover and subsurface rocks are over 35 percent volume.

Soil Survey Area: Component (Mapunit Symbol)  
 CA802: Nipintuck Family (126, 182); Wassit (348)

**Table 4. Representative soil features**

Parent material	(1) Residuum–metasedimentary rock (2) Volcanic ash (3) Colluvium–basalt (4) Residuum–basalt
Surface texture	(1) Very gravelly loamy sand (2) Very stony sandy loam
Drainage class	Well drained
Permeability class	Moderately slow to moderately rapid
Depth to restrictive layer	6–20 in
Surface fragment cover <=3"	23–41%
Surface fragment cover >3"	2–23%
Available water capacity (Depth not specified)	0.8–1.4 in
Subsurface fragment volume <=3" (Depth not specified)	22–34%
Subsurface fragment volume >3" (Depth not specified)	16–23%

## Ecological dynamics

Disturbance Response Group (DRG) 19 consists of six ecological sites; F026XY060NV, F026XY044NV, F026XY061NV, F026XY069NV, F026XY104NV, F026XY071NV (Stringham et al. 2021). Site R026XF613CA is similar to the sites found in DRG 19. This group receives 10 to 14 inches of precipitation each year. Elevations range from 5,000 to 9,000 while slopes range from 15 to 75 percent. The soils are typically shallow to moderately deep and well drained and the water holding capacity is low to moderate. The soils are generally skeletal with 35 to 50 percent gravels, cobbles, or stones, by volume, distributed throughout the soil profile. This group is dominated by singleleaf pinyon (*Pinus monophylla*) with mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) as the primary understory shrub. Utah juniper (*Juniperus osteosperma*) and curl-leaf mountain mahogany (*Cercocarpus ledifolius*) are minor components. Other subdominant shrubs in the group include Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and antelope bitterbrush (*Purshia tridentata*). The dominant understory grass is Thurber's needlegrass (*Achnatherum thurberianum*) or desert needlegrass (*Achnatherum speciosum*). Other grasses in the group include muttongrass (*Poa fendleriana*) and prairie junegrass (*Koeleria macrantha*). Under medium canopy cover (20-30%), understory production ranges from 200 to 450 pounds per acre in a normal year.

### General State and Transition Model Narrative for Group 19:

This is a text description of the states, phases, transitions, and community pathways possible in the State and Transition model for the MLRA 26 disturbance response group 19.

#### Reference State 1.0:

The Reference State 1.0 is representative of the natural range of variability under pristine conditions. This Reference State has four general community phases: an old-growth woodland phase, a shrub-herbaceous phase, an immature tree phase, and an infilled tree phase. 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. Plant community phase changes are primarily driven by fire, periodic long-term drought, and/or insect or disease attack. Fires are typically small and patchy due to low fuel loads. This fire type will create a plant community mosaic that will include all/most of the following community phases within this state.

#### Community Phase 1.1:

This phase is characterized by widely dispersed old-growth singleleaf pinyon trees with an understory of mountain big sagebrush and perennial bunchgrasses. The visual aspect is dominated by singleleaf pinyon with 15 percent or

greater canopy cover (USDA 1997). Utah juniper may be present. Trees have reached maximal or near maximal heights for the site and many tree crowns may be flat- or round-topped. Thurber's needlegrass and bluegrasses are the most prevalent grasses in the understory. Mountain big sagebrush is the primary understory shrub. Forbs such as arrowleaf balsamroot (*Balsamorhiza sagittata*) and tapertip hawksbeard (*Crepis acuminata*) are minor components. Utah juniper may be present.

Community Phase Pathway 1.1a, from Phase 1.1 to 1.2:

A high-severity crown fire will eliminate or reduce the singleleaf pinyon overstory and the shrub component. This allows for the perennial bunchgrasses to dominate the site.

Community Phase Pathway 1.1b, from Phase 1.1 to 1.4:

Time without disturbance such as fire, long-term drought, or disease will allow for the gradual infilling of singleleaf pinyon.

Community Phase 1.2:

This community phase is characterized by a post-fire shrub and herbaceous community. Thurber's needlegrass, bluegrasses, and other perennial grasses dominate. Thurber's needlegrass can experience high mortality from fire and may be reduced in the community for several years. Forbs may increase post-fire but will likely return to pre-burn levels within a few years. Singleleaf pinyon seedlings up to 4 feet in height may be present. Mountain big sagebrush may be present in unburned patches. Burned tree skeletons may be present; however, these have little or no effect on the understory vegetation.

Community Phase Pathway 1.2a, from Phase 1.2 to 1.3:

Time without disturbance such as fire, long-term drought, or disease will allow for the gradual maturation of the singleleaf pinyon component. Mountain big sagebrush reestablishes. Excessive herbivory may also reduce perennial grass understory.

Community Phase 1.3

This community phase is characterized as an immature woodland with singleleaf pinyon trees averaging over 4.5 feet in height. Pinyon canopy cover is between 10 to 20 percent. Tree crowns are typically cone- or pyramidal-shaped. Understory vegetation consists of smaller tree seedling and saplings, as well as perennial bunchgrasses and sagebrush.

Community Phase Pathway 1.3a, from Phase 1.3 to 1.2:

Fire reduces or eliminates tree canopy, allowing perennial grasses to dominate the site.

Community Phase Pathway 1.3b, from Phase 1.3 to 1.1:

Time without disturbance such as fire, long-term drought, or disease will allow for the gradual maturation of singleleaf pinyon. Excessive herbivory may also reduce perennial grass understory.

Community Phase 1.4 (at-risk):

This phase is dominated by singleleaf pinyon. The stand exhibits mixed age classes and canopy cover exceeds 30 percent. The density and vigor of the mountain big sagebrush and perennial bunchgrass understory is decreased. Bare ground areas are likely to increase. Mat-forming forbs may increase. Utah juniper may be present. This community is at risk of crossing a threshold; without proper management this phase will transition to the infilled woodland state 3.0. This community phase is typically described as early Phase II woodland (Miller et al. 2008).

Community Phase Pathway 1.4a, from Phase 1.4 to 1.1:

Low intensity fire, insect infestation, or disease kills individual trees within the stand reducing canopy cover to less than 35 percent. Over time young trees mature to replace and maintain the old-growth woodland. The mountain big sagebrush and perennial bunchgrass community increases in density and vigor.

Community Phase Pathway 1.4b, from Phase 1.4 to 1.2:

A high-severity crown fire will eliminate or reduce the singleleaf pinyon overstory and the shrub component which will allow for the perennial bunchgrasses to dominate the site.

T1A: Transition from Reference State 1.0 to Current Potential State 2.0:

Trigger: Introduction of non-native annual species.

Slow variables: Over time the annual non-native plants 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.

T1B: Transition from Reference State 1.0 to Infilled Tree State 3.0:

Trigger: Time and a lack of disturbance allow trees to dominate site resources; may be coupled with inappropriate grazing management that favors shrub and tree dominance.

Slow variables: Over time the abundance and size of trees will increase.

Threshold: Singleleaf pinyon canopy cover is greater than 50 percent. Little understory vegetation remains due to competition with trees for site resources.

Current Potential State 2.0:

This state is similar to the Reference State 1.0, with four general community phases: an old-growth woodland phase, a shrub-herbaceous phase, an immature tree phase, and an infilled tree phase. Ecological function has not changed, however the resiliency of the state has been reduced by the presence of non-native species. These non-natives, particularly cheatgrass, can be highly flammable and promote fire where historically fire had been infrequent. 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. 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. Fires within this community with the small amount of non-native annual species present are likely still small and patchy due to low fuel loads. This fire type will create a plant community mosaic that will include all/most of the following community phases within this state.

Community Phase 2.1:

This phase is characterized by a widely dispersed old-growth singleleaf pinyon trees with an understory of mountain big sagebrush and perennial bunchgrasses. The visual aspect is dominated by singleleaf pinyon with 15 percent or greater canopy cover (USDA 1997). Utah juniper may be present. Trees have reached maximal or near maximal heights for the site and many tree crowns may be flat- or round-topped. Thurber's needlegrass and bluegrasses are the most prevalent grasses in the understory. Mountain big sagebrush is the primary understory shrub. Forbs such as arrowleaf balsamroot and tapertip hawksbeard are minor components. Utah juniper may be present.

Community Phase Pathway 2.1a, from Phase 2.1 to 2.2:

A high-severity crown fire will eliminate or reduce the singleleaf pinyon overstory and the shrub component. This allows for the perennial bunchgrasses to dominate the site.

Community Phase Pathway 2.1b, from Phase 2.1 to 2.4:

Time without disturbance such as fire, long-term drought, or disease will allow for the gradual infilling of singleleaf pinyon.

Community Phase 2.2:

This community phase is characterized by a post-fire shrub and herbaceous community. Thurber's needlegrass, bluegrass, and other perennial grasses dominate. Forbs may increase post-fire but will likely return to pre-burn levels within a few years. Pinyon seedlings up to 4.5 feet in height may be present. Mountain big sagebrush may be present in unburned patches. Burned tree skeletons may be present; however, these have little or no effect on the understory vegetation. Annual non-native species generally respond well after fire and may be stable or increasing within the community.

Community Phase Pathway 2.2a, from Phase 2.2 to 2.3:

Time without disturbance such as fire, long-term drought, or disease will allow for the gradual maturation of the singleleaf pinyon component. Mountain big sagebrush reestablishes. Excessive herbivory may also reduce perennial grass understory.

Community Phase 2.3:

This community phase is characterized by an immature woodland, with singleleaf pinyon trees averaging over 4.5 feet in height. Tree canopy cover is between 10 to 20 percent. Tree crowns are typically cone- or pyramidal-shaped.

Understory vegetation consists of smaller tree seedling and saplings, as well as perennial bunchgrasses and shrubs. Annual non-native species are present.

Community Phase Pathway 2.3a, from Phase 2.3 to 2.2:

Fire reduces or eliminates tree canopy, allowing perennial grasses to dominate the site.

Community Phase Pathway 2.3b, from Phase 2.3 to 2.1:

Time without disturbance such as fire, long-term drought, or disease will allow for the gradual maturation of singleleaf pinyon. Excessive herbivory may also reduce the perennial grass understory.

Community Phase 2.4 (at-risk):

This phase is dominated by singleleaf pinyon and Utah juniper may be present. The stand exhibits mixed age classes and canopy cover exceeds 30 percent. The density and vigor of the mountain big sagebrush and perennial bunchgrass understory is decreased. Bare ground areas are likely to increase. Mat-forming forbs may increase. Annual non-native species are present primarily under tree canopies. Utah juniper may be present. This community is at risk of crossing a threshold, without proper management this phase will transition to the Infilled Tree State 3.0. This community phase is typically described as early Phase II woodland (Miller et al. 2008).

Community Phase Pathway 2.4a, from Phase 2.4 to 2.1:

Low intensity fire, insect infestation, or disease kills individual trees within the stand, reducing canopy cover to less than 35 percent. Over time young trees mature to replace and maintain the old-growth woodland. The mountain big sagebrush and perennial bunchgrass community increases in density and vigor. Annual non-natives present in trace amounts.

Community Phase Pathway 2.4b, from Phase 2.4 to 2.2:

A high-severity crown fire will eliminate or reduce the singleleaf pinyon overstory and the shrub component which will allow for the perennial bunchgrasses to dominate the site. Annual non-native grasses typically respond positively to fire and may increase in the post-fire community.

T2A: Transition from Current Potential State 2.0 to Infilled Tree State 3.0:

Trigger: Time and a lack of disturbance allow trees to dominate site resources; may be coupled with inappropriate grazing management that favors shrub and tree dominance.

Slow variables: Over time the abundance and size of trees will increase.

Threshold: Pinyon canopy cover is greater than 30%. Little understory vegetation remains due to competition with trees for site resources.

T2B: Transition from Current Potential State 2.0 to Annual State 4.0:

Trigger: Catastrophic crown fire facilitates the establishment of non-native, annual weeds.

Slow variables: Increase in tree crown cover, loss of perennial understory and an increase in annual non-native species.

Threshold: Cheatgrass or other non-native annuals dominate understory. Loss of deep-rooted perennial bunchgrasses changes spatial and temporal nutrient cycling and nutrient redistribution, and reduces soil organic matter. Increased canopy cover of trees allows severe stand-replacing fire. The increased seed bank of non-native, annual species responds positively to post-fire conditions facilitating the transition to an Annual State.

Infilled Tree State 3.0:

This state has two community phases that are characterized by the dominance of singleleaf pinyon in the overstory. This state is identifiable by greater than 50 percent cover of singleleaf pinyon and a mixed age class. Older trees are at maximal height and upper crowns may be flat-topped or rounded. Younger trees are typically cone- or pyramidal-shaped. Understory vegetation is sparse due to increasing shade and competition from trees.

Community Phase 3.1:

Singleleaf pinyon dominates the aspect. Understory vegetation is thinning. Perennial bunchgrasses are sparse and mountain big sagebrush skeletons are as common as live shrubs due to tree competition for soil water, overstory shading, and duff accumulation. Tree canopy cover is greater than 50 percent. Utah juniper may be present. Annual non-native species are present or co-dominate in the understory. Bare ground areas are prevalent and soil redistribution is evident. This community phase is typically described as a Phase II woodland (Miller et al. 2008).



Community Phase Pathway 3.1a, from Phase 3.1 to 3.2:

Time without disturbance such as fire, long-term drought, or disease will allow for the gradual maturation of singleleaf pinyon. Infilling by younger trees continues.

Community Phase 3.2:

Singleleaf pinyon dominates the aspect and Utah juniper may be present. Tree canopy cover exceeds 50 percent. Utah juniper may be present. Understory vegetation is sparse to absent. Perennial bunchgrasses, if present exist in the dripline or under the canopy of trees. Mountain sagebrush skeletons are common or the sagebrush has been extinct long enough that only scattered limbs remain. Mat-forming forbs or Sandberg's bluegrass may dominate interspaces. Annual non-native species are present and are typically found under the trees. Bare ground areas are large and interconnected. Soil redistribution may be extensive. This community phase is typically described as a Phase III woodland (Miller et al. 2008).

T3A Transition from Infilled Tree State 3.0 to Annual State 4.0:

Trigger: Catastrophic fire reduces the tree overstory and allows for the annual non-native species in the understory to dominate the site. Soil disturbing treatments such as slash and burn may also reduce tree canopy and allow for non-native annual species to increase.

Slow variables: Over time, cover and production of annual non-native species increases.

Threshold: Loss of deep-rooted perennial bunchgrasses and shrubs changes temporal and spatial nutrient capture and cycling within the community. Increased, continuous fine fuels modify the fire regime by increasing frequency, size, and spatial variability of fires.

R3A Restoration from Infilled Tree State 3.0 to Current Potential State 2.0:

Manual or mechanical thinning of trees coupled with seeding. Probability of success is highest from community phase 3.1.

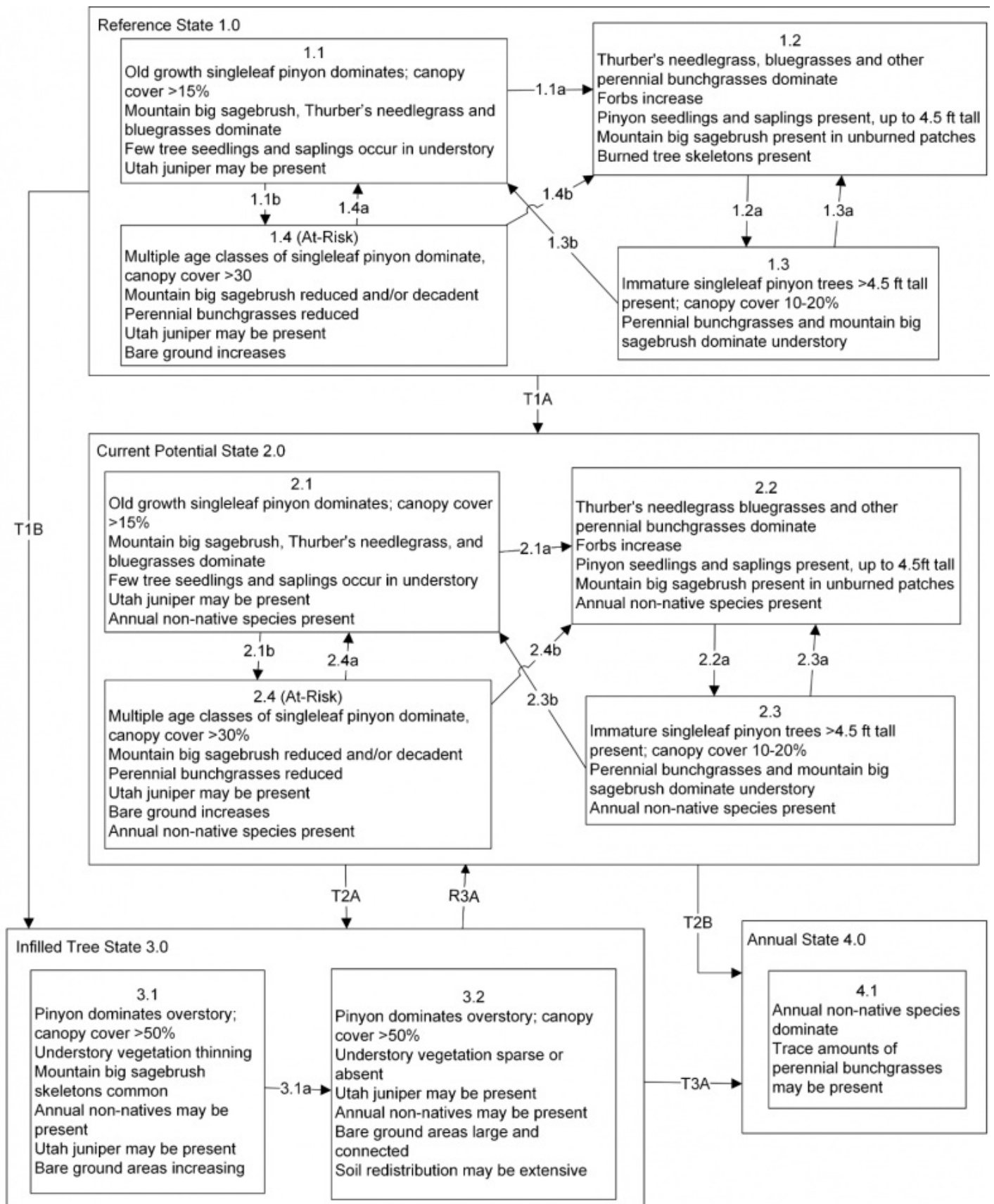
Annual State 4.0:

This community is characterized by the dominance of annual non-native species such as cheatgrass and tansy mustard in the understory. Rabbitbrush or other sprouting shrubs may dominate the overstory. Annual non-native species dominate the understory. Ecological dynamics are significantly altered in this state. Annual non-native species create a highly combustible fuel bed that shortens the fire return interval. Nutrient cycling is spatially and temporally truncated as annual plants contribute significantly less to deep soil carbon. This state was not seen in MLRA 26 during field work for this project, however it is possible given increased fire activity in these sites and their proximity to known annual states of sagebrush ecological sites. We refer the reader to the report for Disturbance Response Group 21 for MLRA 28A and 28B.

Community Phase 4.1:

Cheatgrass, mustards and other non-native annual species dominate the site. Trace amounts of perennial bunchgrasses may be present. Sprouting shrubs may increase. Burned tree skeletons present.

## **State and transition model**



## KEY

### Reference State 1.0 Community Pathways

- 1.1a: High severity crown fire reduces or eliminates tree cover.
- 1.1b: Time and lack of disturbance such as fire, disease, or drought allows younger trees to infill.
- 1.2a: Time and lack of disturbance such as fire or drought. Excessive herbivory may also reduce perennial grass understory.
- 1.3a: Fire.
- 1.3b: Time and lack of disturbance such as fire or drought. Excessive herbivory may also reduce perennial grass understory.
- 1.4a: Low severity fire, insect infestation, or disease removes individual trees and reduces total tree cover.
- 1.4b: High severity crown fire reduces or eliminates tree cover.

Transition T1A: Introduction of non-native annual species.

Transition T1B: Time and a lack of disturbance allows for trees to dominate site resources; may be coupled with inappropriate grazing management that favors shrub and tree dominance.

### Current Potential State 1.0 Community Pathways

- 2.1a: High severity crown fire reduces or eliminates tree cover.
- 2.1b: Time and lack of disturbance such as fire, disease, or drought allows younger trees to infill.
- 2.2a: Time and lack of disturbance such as fire or drought. Excessive herbivory or inappropriate grazing may also reduce perennial grass understory.
- 2.3a: Fire.
- 2.3b: Time and lack of disturbance such as fire or drought. Excessive herbivory or inappropriate grazing may also reduce perennial grass understory.
- 2.4a: Low severity fire, insect infestation, or disease removes individual trees and reduces total tree cover.
- 2.4b: High severity crown fire reduces or eliminates tree cover.

Transition T2A: Time and a lack of disturbance allows for trees to dominate site resources; may be coupled with inappropriate grazing management that favors shrub and tree dominance.

Transition T2B: Catastrophic fire.

### Infilled Tree State 3.0 Community Pathways

- 3.1a: Time and lack of disturbance such as fire, disease, or drought allows younger trees to infill.

Transition T3A: Catastrophic fire.

Restoration Pathway R3A: Thinning of trees coupled with seeding. Success unlikely from phase 3.2.

### Annual State 4.0 Community Pathways

None.

## State 1

### Reference State

#### Community 1.1

#### Pinyon

#### Dominant plant species

- singleleaf pinyon (*Pinus monophylla*), tree

#### Additional community tables

#### Inventory data references

NASIS data for CA802

## References

Stringham, T.K., D. Snyder, P. Novak-Echenique, K. O'Neill, A. Lyons, and M. Johns. 2021. Great Basin Ecological Site Development Project: State-and-Transition Models for Major Land Resource Area 26, Nevada and Portions of California..

## Contributors

Patti Novak-Echenique  
Tamzen Stringham

## 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)	
Contact for lead author	
Date	04/25/2024
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

1. **Number and extent of rills:**

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2. **Presence of water flow patterns:**

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3. **Number and height of erosional pedestals or terracettes:**

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

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5. **Number of gullies and erosion associated with gullies:**

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6. **Extent of wind scoured, blowouts and/or depositional areas:**

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7. **Amount of litter movement (describe size and distance expected to travel):**

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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):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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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):**

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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:

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

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14. **Average percent litter cover (%) and depth ( in):**

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

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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:

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17. **Perennial plant reproductive capability:**

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