

## Ecological site F030XC288NV

# Pinus monophylla-Juniperus osteosperma/Quercus gambelii-Cercocarpus ledifolius var. intermontanus/Poa fendleriana-Bouteloua gracilis

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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.

## Classification relationships

Nachlinger, J. and G. Reese. 1996. Plant Community Classification of the Spring Mountains National Recreation Area, Clark and Nye Counties, Nevada. The Nature Conservancy. Reno, Nevada. II. Low Conifer Woodland, Montane Shrubland, and Chaparral Zone. 7a - Pinus monophylla-Juniperus osteosperma/Artemisia tridentata Association. Singleleaf pinyon pine-Utah juniper/big sagebrush Series. Page I-38.

## Ecological site concept

This forest site occurs on fan remnants. Slopes range from 4 to 15 percent. Elevations are 6400 to 7900 feet. The soils associated with this site are typically very deep, well drained soils that formed in alluvium from quartzite, limestones and dolomitic limestones.

## Associated sites

F030XC240NV	<b>Pinus monophylla/Cercocarpus ledifolius-Quercus gambelii/Poa fendleriana</b> Occurs at higher elevations. Pinyon woodland.
F030XC246NV	<b>Pinus monophylla-Juniperus osteosperma/Purshia stansburiana-Artemisia tridentata ssp. vaseyana/Poa fendleriana</b> Occurs on adjacent mountain slopes. Pinyon juniper woodland.

## Similar sites

F030XC244NV	<b>Pinus monophylla-Juniperus osteosperma/Cercocarpus ledifolius var. intermontanus/Bouteloua gracilis</b> Occurs on fan remnants. Stansbury cliffrose common.
F030XC278NV	<b>Pinus monophylla-Juniperus osteosperma/Artemisia tridentata ssp. vaseyana/Poa fendleriana-Bouteloua gracilis</b> Occurs on hills and mountain backslopes. Soils moderately deep. Lower site index.

**Table 1. Dominant plant species**

Tree	(1) <i>Pinus monophylla</i> (2) <i>Juniperus osteosperma</i>
Shrub	(1) <i>Quercus gambelii</i> (2) <i>Cercocarpus ledifolius var. intermontanus</i>
Herbaceous	(1) <i>Poa fendleriana</i> (2) <i>Bouteloua gracilis</i>

## Physiographic features

This forest site occurs on fan remnants. Slopes range from 4 to 15 percent. Elevations are 6400 to 7900 feet.

**Table 2. Representative physiographic features**

Landforms	(1) Fan remnant
Elevation	1,951–2,408 m
Slope	4–15%
Aspect	Aspect is not a significant factor

## Climatic features

The primary air masses affecting the Spring Mountains are cold maritime polar air from the Gulf of Alaska and warmer, moist maritime subtropical air from lower latitudes. Occasionally there are invasions of cold continental polar air from northern Canada or the Rocky Mountains. Precipitation in the area results primarily from the passage of cyclones with associated fronts during fall, winter and spring; from closed cyclones in late winter and spring; and from the flow of moist tropical air from the southeast to the southwest quadrant in the summer.

The mean annual precipitation is about 14 to 18 inches. The mean annual air temperature is 45 to 52 degrees F. The average growing season is about 90 to 130 days. There are no climate stations associated with this site.

**Table 3. Representative climatic features**

Frost-free period (average)	130 days
Freeze-free period (average)	
Precipitation total (average)	457 mm

## Influencing water features

There are no influencing water features associated with this site.

## Soil features

The soils associated with this site are typically very deep, well drained soils that formed in alluvium from quartzite, limestones and dolomitic limestones. The soil surface is typically covered with a thin (+1) slightly decomposed, organic layer. The soil surface is covered by approximately 20 percent gravel, 2 percent cobbles and 1 percent stones. The soil moisture is usually dry, and moist in some part for short periods during winter, early spring and late summer. These soils have an aridic bordering on ustic moisture regime. The soil temperature regime is mesic. Soil series associated with this site includes Charkiln and Woodspring.

**Table 4. Representative soil features**

Surface texture	(1) Gravelly loam (2) Gravelly sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately slow to moderately rapid
Soil depth	183 cm
Surface fragment cover <=3"	15–20%
Surface fragment cover >3"	0–5%

Available water capacity (0-101.6cm)	2.79–13.72 cm
Calcium carbonate equivalent (0-101.6cm)	0–20%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–2
Soil reaction (1:1 water) (0-101.6cm)	5.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	6–75%
Subsurface fragment volume >3" (Depth not specified)	0–10%

## Ecological dynamics

The pinyon-juniper forest is generally a climax vegetation type throughout its range, reaching climax about 300 years after disturbance, with an ongoing trend toward increased tree density and canopy cover and a decline in understory species over time. Singleleaf pinyon seedling establishment is episodic. Population age structure is affected by drought, which differentially reduces seedling and sapling recruitment more than other age classes. The ecotones between singleleaf pinyon forests and adjacent shrublands and grasslands provide favorable microhabitats for singleleaf pinyon seedling establishment since they are active zones for seed dispersal, nurse plants are available, and singleleaf pinyon seedlings are only affected by competition from grass and other herbaceous vegetation for a couple of years.

Several natural and anthropogenic processes can lead to changes in the spatial distribution of pinyon-juniper forests over time. These include 1) tree seedling establishment during favorable climatic periods, 2) tree mortality (especially seedlings and saplings) during periods of drought, 3) expansion of trees into adjacent grassland in response to overgrazing and/or fire suppression, and 4) removal of trees by humans, fire, or other disturbance episodes. Specific successional pathways after disturbance in singleleaf pinyon stands are dependent on a number of variables such as plant species present at the time of disturbance and their individual responses to disturbance, past management, type and size of disturbance, available seed sources in the soil or adjacent areas, and site and climatic conditions throughout the successional process.

### Fire Ecology:

In the Great Basin, there is evidence of both frequent, low-severity fires carried by once-abundant perennial grasses, and less frequent, localized stand-replacement fires during extreme conditions. Fires burned in irregular patterns, producing a mosaic of burned and unburned landscape. On high-productivity sites where sufficient fine fuels existed, fires burned every 15 to 20 years, and on less productive sites with patchy fuels, fire intervals may have been in the range of 50 to 100 years or longer. Fire frequency in singleleaf pinyon communities varies with fuel loads and ignition source that, in turn, vary with habitat type, aspect, topography, stand history, and climatic conditions.

### Major Successional Stages of Forest Development:

**Herbaceous:** Vegetation is dominated by grasses and forbs under full sunlight. This stage is experienced after a major disturbance such as crown fire. Skeleton forest (dead trees), remaining after fire or residual trees left following harvest, have little or no affect on the composition and production of the herbaceous vegetation.

**Shrub Herbaceous:** Herbaceous vegetation and woody shrubs dominate the site. Various amounts of tree seedlings (less than 20 inches in height) may be present up to the point where they are obviously a major component of the vegetal structure.

**Sapling:** In the absence of disturbance, tree seedling develops into saplings (20 inches to 4.5 feet in height) with a range in canopy cover of about 5 to 10 percent. Vegetation consists of grasses, forbs, and shrubs in association

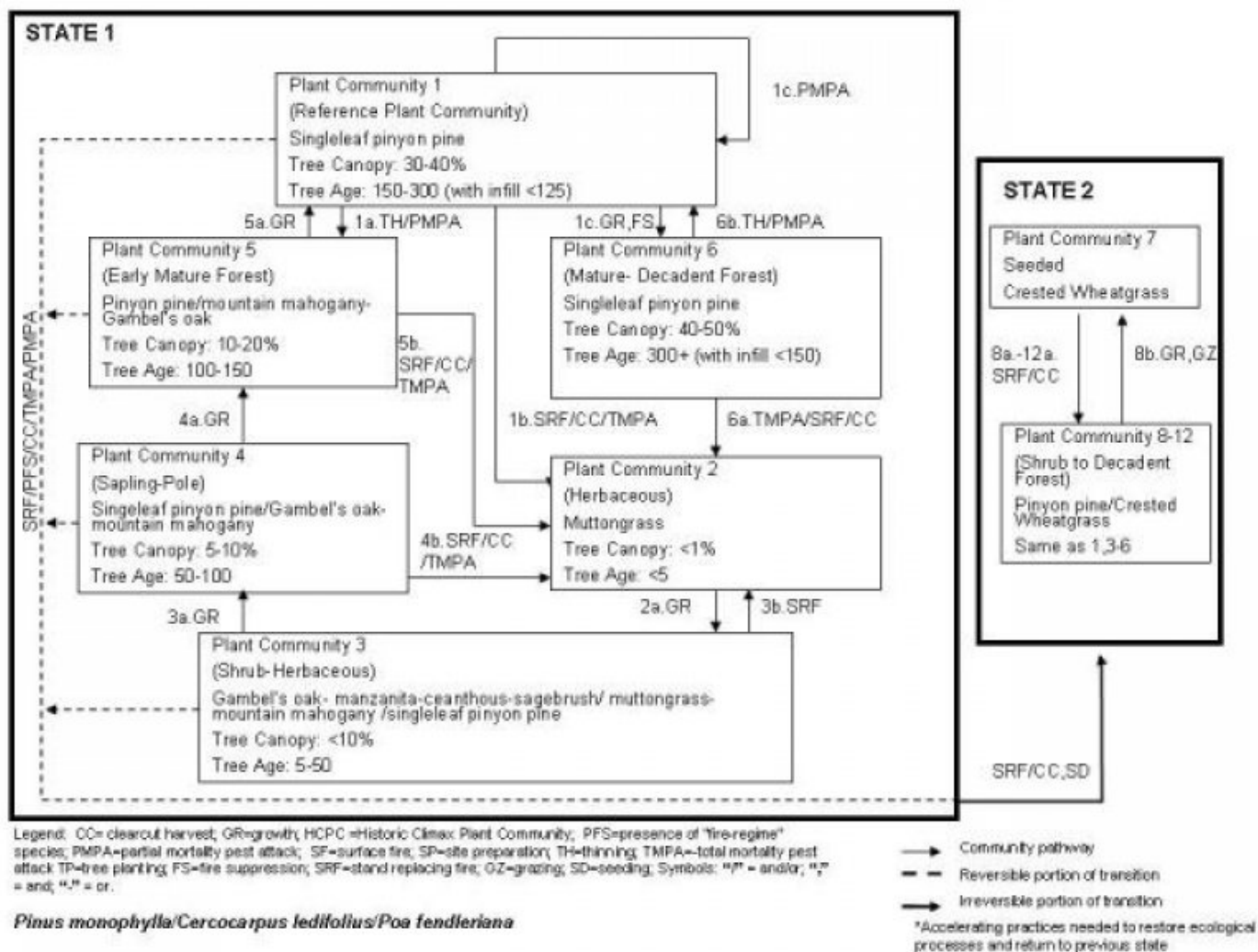
with tree samplings.

**Immature Forest:** The visual aspect and vegetal structure are dominated by Utah juniper trees and singleleaf pinyon trees greater than 4.5 feet in height. The upper crown of dominant and co-dominant trees are cone or pyramidal shaped. Seedling and saplings of pinyon and Utah juniper are present in the understory. Dominants are the tallest trees on the site; co-dominants are 65 to 85 percent of the highest of dominant trees. Understory vegetation is moderately influenced by a tree overstory canopy of about 10 to 25 percent.

**Mature Forest (Reference Plant Community):** The visual aspect and vegetal structure are dominated by singleleaf pinyon and Utah juniper that have reached or are near maximal heights for the site. Dominant trees average greater than five inches in diameter at one-foot stump. Upper crowns of singleleaf pinyon and Utah juniper are typically either irregularly or smoothly flat-topped or rounded. Tree canopy cover ranges from 35 to about 45 percent. Understory vegetation is strongly influenced by tree competition, overstory shading, duff accumulation, etc. Infrequent, yet periodic wildfire is presumed to be a natural disturbance influencing the understory of mature pinyon-juniper forests. This stage of community development is assumed to be representative of this woodland site in the pristine environment.

**Over-Mature Forest:** In the absence of wildfire or other naturally occurring disturbances, the tree canopy on this site can become very dense. This stage is dominated by singleleaf pinyon and Utah juniper that have reached maximal heights for the site. Dominant and co-dominant trees average greater than five inches in diameter at one-foot stump height. Upper crowns are typically irregularly flat-topped or rounded. Understory vegetation is sparse or absent due to tree competition, overstory shading, duff accumulation, etc. Tree canopy cover is commonly greater than 40 percent.

## **State and transition model**



## State 1 Reference Plant Community

### Community 1.1 Reference Plant Community

The reference plant community is dominated by singleleaf pinyon and Utah juniper. An overstory canopy cover of about 40 percent is assumed to be representative of tree dominance on this site in the pristine environment. Overstory tree canopy composition is about 40 to 60 percent singleleaf pinyon and 60 to 40 percent Utah juniper. The understory includes curlleaf mountainmahogany, Gambel oak, muttongrass and blue grama.

Table 5. Ground cover

Tree foliar cover	35-45%
Shrub/vine/liana foliar cover	5-10%
Grass/grasslike foliar cover	1-5%
Forb foliar cover	1-5%
Non-vascular plants	0%
Biological crusts	0%
Litter	60-80%
Surface fragments >0.25" and <=3"	10-30%
Surface fragments >3"	0-5%

Bedrock	0%
Water	0%
Bare ground	10-20%

**Table 6. Canopy structure (% cover)**

Height Above Ground (M)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.15	1-5%	1-5%	1-5%	1-5%
>0.15 <= 0.3	1-5%	1-5%	1-5%	1-5%
>0.3 <= 0.6	1-5%	1-5%	—	1-2%
>0.6 <= 1.4	1-10%	5-10%	—	—
>1.4 <= 4	10-40%	1-2%	—	—
>4 <= 12	10-20%	—	—	—
>12 <= 24	—	—	—	—
>24 <= 37	—	—	—	—
>37	—	—	—	—

## Additional community tables

### Animal community

#### Livestock Interpretations:

This site is suited to cattle and sheep grazing during the summer and fall. Feral horses may use this site year round if water is available. Grazing management should be keyed to blue grama and muttongrass production. Livestock will often concentrate on this site taking advantage of the shade and shelter offered by the tree overstory. Many areas are not used because of steep slopes or lack of adequate water. Harvesting trees under a sound management program can open up the tree canopy to allow increased production of understory species desirable for grazing.

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:

This site has high value for mule deer during the summer, fall and winter. Pinyon trees provide shelter from winter storms and juniper foliage is also browsed during the winter. Sites where water is available offer good quail habitat and are visited seasonally by mourning dove. Various songbirds, rodents, reptiles and associated predators native to the area also use it.

### Hydrological functions

Runoff is low to high.

### Recreational uses

This site has potential for hiking, cross-country skiing, camping and deer and upland game hunting.

### Wood products

Pinyon wood is rather soft, brittle, heavy with pitch, and yellowish brown in color. Singleleaf pinyon has played an important role as a source of fuelwood and mine props. It has been a source of wood for charcoal used in ore smelting. It still has a promising potential for charcoal production.

Utah juniper wood is very durable. Its primary uses have been for posts and fuelwood. It probably has considerable potential in the charcoal industry and in wood fiber products.

This forest community is of moderate to high site quality for tree production. Site index ranges from 80 to 120. (Howell, 1940).

Productivity Class: 0

Fuelwood Production: 11 to 16 cord per acre for stands averaging 5 inches in diameter at 1 foot height with a medium canopy cover. There are about 289,000 gross British Thermal Units (BTUs) heat content per cubic foot of pinyon pine wood and about 274,000 gross BUTs heat content per cubic foot of Utah juniper. Solid wood volume in a cord varies but usually ranges from 65 to 90 cubic feet. Assuming an average of 75 cubic feet of solid wood per cord, there are about 21 million BTUs of heat value in a cord of mixed pinyon pine and Utah juniper.

Posts (7 foot): About 20 to 35 post per acres in stands of medium canopy.

#### Limitations and Considerations

- a. Potential for sheet and rill erosion is moderate to severe depending on slope.
- b. Moderate to severe equipment limitations on steeper slopes and moderate to severe equipment limitations on sites having extreme surface stoniness.
- c. Proper spacing is the key to a well managed, multiple use and multi-product pinyon forests.

#### Essential Requirements

- a. Harvest cut selectively or in small patches size dependent upon site conditions to enhance forage production.
  1. Thinning and improvement cutting – Removal of poorly formed, diseased and low vigor trees for fuelwood.
  2. Harvest cutting – Selectively harvest surplus trees to achieve desired spacing. Save large, healthy, full-crowned singleleaf pinyon trees for nut producers. Do not select only “high grade” trees during harvest.
  3. Slash Disposal – Broadcasting slash improves reestablishment of native understory herbaceous species and establishment of seeded grasses and forbs after tree harvest.
  4. Spacing Guide – D+9 (A higher spacing is required if managing for Christmas trees).
- b. Prescription burning program to maintain desired canopy cover and manage site reproduction.
- c. Mechanical tree removal (i.e. chaining) is not recommended on this site.
- d. Pest control – Porcupines can cause extensive damage and populations should be controlled.
- e. Fire hazard – Fire usually not a problem in well-managed, mature stands.

### Other products

Some important uses for pinyon pine are for Christmas trees and as a source of nuts for wildlife and human food. These trees have provided Indians with food for centuries. Thousands of pounds of nuts are gathered each year and sold on commercial markets throughout the United States.

Christmas trees: About 5 trees per acre per year in stands of medium canopy.

Pinyon nuts: Production varies year to year, but mature stands can yield about 100 pounds per acre in favorable years.

### Other information

There are 4 plant species of concern associated with this ecological site within the Spring Mountain National Recreational Area (SMNRA). There are 3 animal species of concern located within this ecological type.

**Table 7. Representative site productivity**

Common Name	Symbol	Site Index Low	Site Index High	CMAI Low	CMAI High	Age Of CMAI	Site Index Curve Code	Site Index Curve Basis	Citation
singleleaf pinyon	<i>PIMO</i>	80	120	10	14	—	—	—	

## Type locality

Location 1: Clark County, NV	
Township/Range/Section	T18 S R55 E S20
UTM zone	N
UTM northing	4025205n
UTM easting	605803e
General legal description	Approximately 1.2 miles south of Wheeler Well, west flank for Spring Mountains, Clark County, Nevada.

## Other references

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Howell, J. 1940. Pinyon and juniper: a preliminary study of volume, growth, and yield. Regional Bulletin 71. Albuquerque, NM: USDA, SCS; 90 p.

Jordan, M. 1974. An Inventory of Two Selected Woodland Sites in the Pine Nut Hills of Western Nevada. MS Thesis, Univ. NV Reno.

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## Contributors

TJ WOLFE

## Approval

Kendra Moseley, 4/26/2024

## 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	05/13/2025
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):**
- 

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):**
- 

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:**
-