

Ecological site F030XC250NV

Singleleaf Pinyon Pine Forestland

Last updated: 4/26/2024
Accessed: 08/27/2026

General information

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

Ecological site concept

This forest site occurs on mountain summits and sideslopes. Although this site occurs on all aspects, it is generally restricted to north-facing aspects at the lower elevations of its range. Slopes range from 30 to 75 percent. Elevations range from 3950 to about 6200 feet. This is a pinyon-juniper site. This site is part of group concept F030XC238NV

Table 1. Dominant plant species

Tree	(1) <i>Pinus monophylla</i>
Shrub	(1) <i>Quercus turbinella</i>
Herbaceous	(1) <i>Achnatherum</i>

Physiographic features

This forest site occurs on mountain summits and sideslopes. Although this site occurs on all aspects, it is generally restricted to north-facing aspects at the lower elevations of its range. Slopes range from 30 to 75 percent. Elevations range from 3950 to about 6200 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountain slope
Elevation	1,200 – 1,890 m
Slope	30 – 80 %
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 10 to 12 inches. Mean annual air temperature is 51 to 55 degrees F. The average growing season is about 140 to 180 days.

Table 3 Representative climatic features

Frost-free period (average)	180 days
Freeze-free period (average)	
Precipitation total (average)	310 mm

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site are typically moderately deep to bedrock, and well drained. These soils have formed in residuum and colluvium from granite, gneiss and schist and other metamorphic rock parent materials. Available water capacity is very low, but trees and shrubs extend their roots into fractures in the bedrock allowing them to utilize deep moisture. There are high amounts of various sized rock fragments. The soil surface is covered with approximately 60 percent gravels, 10 percent cobbles, 5 percent stones, and 2 percent boulders. The soil temperature regime is mesic and the soil moisture regime is aridic bordering on ustic. Soil series associated with site include Jumbopeak.

Table 4. Representative soil features

Surface texture	(1) Extremely gravelly loamy coarse sand (2) Extremely gravelly loamy sand
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately rapid
Soil depth	50 cm
Surface fragment cover <=3"	50 – 70 %
Surface fragment cover >3"	20 – 30 %
Available water capacity (0-101.6cm)	4.06 – 4.32 cm

Calcium carbonate equivalent (0-101.6cm)	Not specified
Electrical conductivity (0-101.6cm)	Not specified
Sodium adsorption ratio (0-101.6cm)	0 – 10
Soil reaction (1:1 water) (0-101.6cm)	10 – 7.8
Subsurface fragment volume <=3" (Depth not specified)	40 – 50 %
Subsurface fragment volume >3" (Depth not specified)	0 – 10 %

Ecological dynamics

The plant communities of this site are dynamic in response to change in disturbance regimes and weather patterns. A variety of disturbances at different temporal and spatial scales influence the vegetation response of a particular site. The natural process of succession is dynamic; an individual plant community can exist in various stable states. Disturbances, such as fire, play an important role in all forest ecosystems. Important processes that are regulated by fire include regeneration and reproduction, seedbed preparation, competition reduction and thinning to maintain stand health (Spurr and Barnes 1964)

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.

Pinyon and juniper forest overstory predicts solar radiation and soil moisture patterns, creating a variety of microclimates within the stand (Breshears et al. 1997). Alternating canopy and inter-canopy patches influence soil moisture and temperature variability. Center portions of canopy patches receive less solar radiation than inter-canopy patches, influencing the kinds and proportions of vegetation growing there. Canopy and inter-canopy patches interact with the kind of precipitation event to influence soil moisture. Generally snow cover is greater in inter-canopy patches, indicating greater soil moisture. However, during rainfall events large enough to generate runoff and stem flow, canopy locations are much wetting than the inter-canopy spaces (Breshears et al. 1997). As the overstory becomes more dense effects on soil moisture and solar radiation influence understory vegetation. Species diversity and understory production decrease with increased shading.

Soils associated with this site provide physical support, moisture and nutrients to the forest community. Trees have reciprocating effects on the soil. Since they tend to exist on site for extended periods of time, their roots typically extend deep into the subsoil and even into fractured bedrock influencing the rate of soil development. Considerable amounts of organic material are returned to the soil in the form of fallen litter and decaying roots. Increased organic matter on the soil surface, or litter layer, helps to keep moisture conditions more uniform. Insulation provided by the tree canopy and litter layer also reduces the temperature fluctuation from day to night (Fisher and Binkley 2002).

In general pinyon-juniper woodlands are open with a shrubby understory. Total vegetative cover is high due to the diverse understory, although the tree cover remains quite low.

Singleleaf pinyon and Utah juniper are highly susceptible to fire damage. Both have thin, highly flammable bark that provides little protection to the cambium and lack self-pruning branches. Generally pinyon-juniper forests occur on xeric sites with infertile, shallow, rocky soils, where fires are infrequent and unpredictable. Years with exceptional rainfall lead to increased herbaceous growth and allows for wildfire to spread. Small trees are more susceptible to mortality from wildfire. Reestablishment occurs solely from seed, rodents and birds often store large amounts of seed. Rate of reestablishment largely depends on size, season, rate of burn, as well as, age of trees when burned. Mature trees produce more seed and therefore build up the seed bank in the soil and increase the rate of return. Reestablishment may take 50 to 100 years to reach pre-fire densities.

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.

Turbinella oak is well adapted to survive fire, it is typically top-killed but resprouts vigorously from the root crown and rhizomes in response to fire or other disturbances. Postfire establishment also occurs from seed. Blackbrush is readily killed by fire and regenerates solely from seed. Recovery post fire may take greater than 60 years. Fire effects on Stansbury cliffrose are variable, severe fire may kill or severely damage cliffrose. Generally it is a weak sprouter that can survive low severity fire. Desert needlegrass tufted growth form makes it susceptible to fire damage. Fast burning cool fires will remove the accumulation and plant will resprout from the surviving root crown. Muttongrass is slow to recover from severe fire, but can easily recover from light burning, especially in the fall.

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	Primary Perennial Grasses			34-90	
	desert needlegrass	ACSP12	Achnatherum speciosum	11-34	–
	muttongrass	POFE	Poa fendleriana	11-34	–
2	Secondary Perennial Grasses			6-28	
	little Parish's needlegrass	ACPAD	Achnatherum parishii var. depauperatum	3-17	–
	little Parish's needlegrass	ACPAD	Achnatherum parishii var. depauperatum	3-17	–
	bush muhly	MUPO2	Muhlenbergia porteri	0-6	–
	James' galleta	PLJA	Pleuraphis jamesii	0-6	–
	bush muhly	MUPO2	Muhlenbergia porteri	0-6	–
	James' galleta	PLJA	Pleuraphis jamesii	0-6	–
Forb					
3	Perennial Forbs			6-22	
	desert globemallow	SPAM2	Sphaeralcea ambigua	2-17	–
	phlox	PHLOX	Phlox	0-6	–
Shrub/Vine					
4	Primary Native Shrubs			112-269	
	Sonoran scrub oak	QUTU2	Quercus turbinella	90-196	–
	blackbrush	CORA	Coleogyne ramosissima	15-28	–
	Stansbury cliffrose	PUST	Purshia stansburiana	15-28	–
5	Secondary Native Shrubs			11-78	
	Nevada jointfir	EPNE	Ephedra nevadensis	3-17	–

	mormon tea	EPVI	<i>Ephedra viridis</i>	3-17	–
	pointleaf manzanita	ARPU5	<i>Arctostaphylos pungens</i>	1-6	–
	longflower rabbitbrush	CHDE2	<i>Chrysothamnus depressus</i>	1-6	–
	Engelmann's hedgehog cactus	ECEN	<i>Echinocereus engelmannii</i>	1-6	–
	narrowleaf goldenbush	ERLI6	<i>Ericameria linearifolia</i>	1-6	–
	snakeweed	GUTIE	<i>Gutierrezia</i>	1-6	–
	banana yucca	YUBA	<i>Yucca baccata</i>	1-6	–
	turpentinebroom	THMO	<i>Thamnosma montana</i>	0-1	–
	Eastern Mojave buckwheat	ERFAP	<i>Eriogonum fasciculatum</i> var. <i>polifolium</i>	0-1	–

Table 6. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height M	Canopy Cover (%)	Diameter Cm	Basal Area (square M/hectare)
Tree							
singleleaf pinyon	PIMO	<i>Pinus monophylla</i>	Native	–	75-80	–	–
Utah juniper	JUOS	<i>Juniperus osteosperma</i>	Native	–	8-12	–	–
Joshua tree	YUBR	<i>Yucca brevifolia</i>	Native	–	5-8	–	–

Table 7. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 1.4 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 10. Community 1.5 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 11. Community 1.6 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 12. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 13. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 14. Community 2.3 plant community composition

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

Livestock Interpretations: This site is suited to cattle and sheep grazing during the summer and fall. Wild horses may use this site year round if water is available. Grazing management should be keyed to needlegrass and galleta grass 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

The runoff on this site is high.

Recreational uses

The trees on this site provide a welcome break in an otherwise open landscape. It has potential for hiking, and deer and upland game hunting.

Wood products

Singleleaf 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. Other important uses for this tree are for Christmas trees and as a source of nuts for wildlife and human food. Christmas trees: About 5 trees per acre per year in stands of medium canopy. This forest community is of low site quality for tree production. Site index ranges from 35 TO 55. (Howell, 1940). Productivity Class: 0 Fuelwood Production: 4 to 7 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 15 to 25 post per acres in stands of medium canopy. Management Guides and Interpretations 1. 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 sties having extreme surface stoniness. c. Proper spacing is the key to a well managed, multiple use and multi-product pinyon forest. 2. Essential Requirements a. Adequately protect from wildfire. b. Protect soils from accelerated erosion. c. Apply proper grazing management. 3. Silvicultural Practices Silvicultural treatmetns are not reasonably applied on this site due to poor site quality and severe limitations for equipment and tree harvest.

Other products

Pinyon-juniper ecosystems have had subsistence, cultural, spiritual, economic, aesthetic and medicinal value to Native American peoples for centuries, and singleleaf pinyon has provided food, fuel, medicine and shelter to Native Americans for thousands of years. The pitch of singleleaf pinyon was used as adhesive, caulking material, and a paint binder. It may also be used medicinally and chewed like gum. Pinyon seeds are a valuable food source for humans, and a valuable commercial crop. Thousands of pounds of nuts are gathered each year and sold on commercial markets throughout the United States. Pinyon nuts: Production varies year to year, but mature stands can yield about 100 pounds per acre in favorable years.

Table 15. 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	PIMO	35	55	3	5	—	—	—	

Type locality

Location 1: Clark County, NV	
Township/Range/Section	T19 S. R70 E. S26 NW
UTM zone	N
UTM northing	4016488n
UTM easting	0755857e

General legal description	Approximately .75 south and .25 miles east of Mica Peak in the Gold Butte area, Clark County, Nevada.
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Other references

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Contributors

GKB/TJW

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	08/27/2026

Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. Number and extent of rills:

2. Presence of water flow patterns:

3. Number and height of erosional pedestals or terracettes:

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

5. Number of gullies and erosion associated with gullies:

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

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

8. Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):

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

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

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:

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

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

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:

17. Perennial plant reproductive capability:
