USDA Natural Resources
Conservation Service

Ecological site F030XC238NV
Shallow Metamorphic Mesic Mountains

Last updated: 4/25/2024
Accessed: 05/08/2024

General information

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

Ecological site concept

This forest site occurs on mountain summits and sideslopes. This site is restricted to northerly aspects at the lower elevations of its range. Slopes are typically 15 to 75 percent. Elevations are 5100 to about 8900 feet.

This is a group concept and provisional STM that also covers F030XC250NV.

Table 1. Dominant plant species

Tree	(1) *Juniperus osteosperma* (2) *Pinus monophylla*
Shrub	(1) *Purshia stansburiana* (2) *Coleogyne ramosissima*
Herbaceous	(1) *Bouteloua gracilis* (2) *Poa fendleriana*

Physiographic features

This forest site occurs on mountain summits and sideslopes. This site is restricted to northerly aspects at the lower elevations of its range. Slopes are typically 15 to 75 percent. Elevations are 5100 to about 8900 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountain slope
Elevation	5,100–8,900 ft
Slope	15–75%
Aspect	N

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.
Average annual precipitation is about 9 to 11(12) inches. Mean annual air temperature is 45 to 50 degrees F. The average growing season is about 90 to 140 days.

Table 3. Representative climatic features

Frost-free period (average)	140 days
Freeze-free period (average)	
Precipitation total (average)	11 in

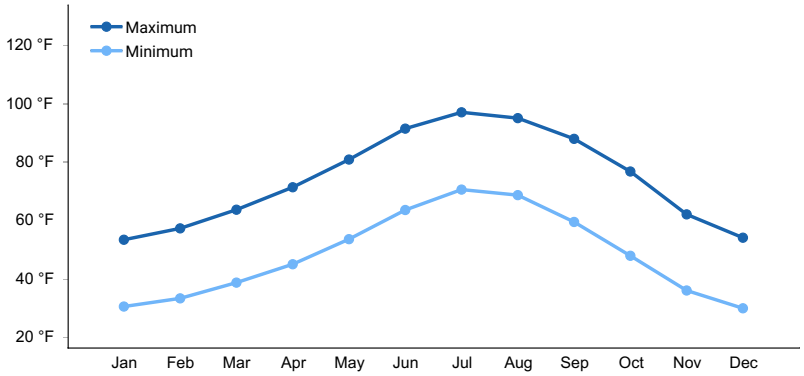


Figure 1. Monthly average minimum and maximum temperature

Influencing water features

There are no influencing water features associated with this site.

Soil features

Soils are shallow and very shallow and well drained. The soils are formed in colluvium and residuum from metamorphic rocks or limestone. Surface soils are generally less than 5 inches thick to a heavy textured subsoil. 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 rock fragments on the soil surface which occupy plant growing space, yet help to reduce evaporation and conserve soil moisture. Runoff is to very high and potential for sheet and rill erosion is slight to moderate depending on slope. The soils associated with this site are Seralin Family, Typic Haplustolls and the soil series Beerbo.

Table 4. Representative soil features

Surface texture	(1) Extremely cobbly sandy loam (2) Very stony loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate
Soil depth	8–20 in
Surface fragment cover <=3"	30–35%
Surface fragment cover >3"	30–35%
Available water capacity (0-40in)	0.6–1.3 in
Calcium carbonate equivalent (0-40in)	0%
Electrical conductivity (0-40in)	0–8 mmhos/cm
Sodium adsorption ratio (0-40in)	0–5
Soil reaction (1:1 water) (0-40in)	6.6–8.4

Subsurface fragment volume <=3" (Depth not specified)	19–46%
Subsurface fragment volume >3" (Depth not specified)	8–40%

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 reduces seedling and sapling recruitment more than other age classes. The ecotones between singleleaf pinyon forest 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:
On high-productivity sites where sufficient fine fuels existed, singleleaf pinyon communities burn every 15 to 20 years, and on less productive sites with patchy fuels, fire return intervals may be in the range of 50 to 100 years or longer. Thin bark and lack of self pruning make singleleaf pinyon very susceptible to intense fire. Mature singleleaf pinyon can survive low-severity surface fires but is killed by more severe fires. Most tree seedlings are killed by fire, but cached seeds may survive.
Utah juniper is usually killed by fire, especially when trees are small. However, Utah juniper habitat types rarely have sufficient fine fuels to produce severe or continuous fires.
Fire effects on Stansbury cliffrose are variable. Fire may kill or severely damage plants. Late-season fire also increases the risk of mortality. Stansbury cliffrose is a weak sprouter that is generally killed by severe fire.
Blue grama has variable fire tolerance; it has fair tolerance when dormant but experiences some damage if burned during active growth, especially during drought. Fire generally favors blue grama, generally increasing its occurrence, production, and percent cover.

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 the tree seedlings develop 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 saplings.

IMMATURE FOREST: The visual aspect and vegetal structure are dominated by Utah juniper trees greater than 4.5 feet in height. The upper crown of dominant and co-dominant trees are cone or pyramidal shaped. Seedlings and saplings of 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

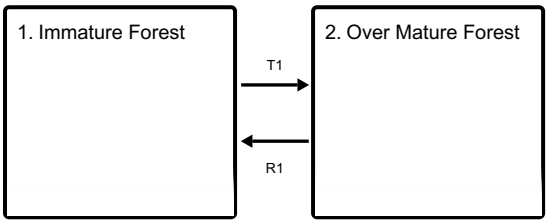
overstory canopy of about 10 to 20 percent.

MATURE FOREST: The visual aspect and vegetal structure are dominated by 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 height. Upper crowns of Utah juniper are typically either irregularly or smoothly flat-topped or rounded. Tree canopy cover ranges from 20 to 30 percent. Understory vegetation is strongly influenced by tree competition, overstory shading, duff accumulation, etc. Few tree seedlings and/or saplings occur in the understory. Infrequent, yet periodic, wildfire is presumed to be a natural factor influencing the understory of mature juniper forests. This stage of community development is assumed to be representative of this forest site in the pristine environment.

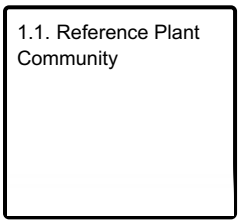
OVER-MATURE FOREST: In the absence of wildfire or other naturally occurring disturbances, the tree canopy on this site can become very dense. This stage is dominated by Utah juniper that have reached maximal heights for the site. Dominant and co-dominant trees average greater than five inches in diameter 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 35 percent.

State and transition model

Ecosystem states



State 1 submodel, plant communities



State 1
Immature Forest

Community 1.1
Reference Plant Community

The reference plant community is dominated by Utah juniper and singleleaf pinyon. Stansbury's cliffrose and desert bitterbrush are the principal understory shrubs. Blue grama and muttongrass are the most prevalent understory grasses. Black grama, skunkbush sumac, Fremont's barberry, and green ephedra are other important understory plants. Blackbrush occurs in the understory and may be more prevalent in areas less subject to wildfire. Overstory tree canopy composition is 40 to 60 percent Utah juniper with 60 to 40 percent singleleaf pinyon. An overstory canopy cover of 30 percent is assumed to be representative of tree dominance on this site in the pristine environment.

State 2
Over Mature Forest

Transition T1
State 1 to 2

Time without fire

Restoration pathway R1

State 2 to 1

Natural fire

Additional community tables

Animal community

Livestock Interpretations:
This site is suited to cattle and sheep grazing where terrain permits. Grazing management should be keyed to black grama and desert needlegrass 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 and lack of adequate water. Attentive grazing management is required due to steep slopes and associated erosion hazards. Harvesting trees under a sound management program for fuelwood, posts or other products can open the tree canopy to allow increased production of understory species desirable for grazing.
Stocking rates vary with such factors as kind and class of grazing animal, season of use and fluctuations in climate. Actual use records for individual sites, a determination of the degree to which the sites have been grazed, and an evaluation of trend in site condition offer the most reliable basis for developing initial stocking rates.
The forage value rating is not an ecological evaluation of the understory as is the range condition rating for rangeland. The forage value rating is a utilitarian rating of the existing understory plants for use by specific kinds of grazing animals.

Hydrological functions

Runoff is very high and permeability is moderately slow.

Recreational uses

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

Wood products

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.
Pinyon wood is rather soft, brittle, heavy with pitch, and yellowish brown in color.

PRODUCTIVE CAPACITY
This forest community is of low site quality for tree production. Site index ranges from 35 to 55 (Howell, 1940).

Productivity Class: 0.2 to 0.4

CMAI*: 3.3 to 5.2 ft3/ac/yr;
0.2 to 0.4 m3/ha/yr.
Culmination is estimated to be at 90 years.
*CMAI: is the culmination of mean annual increment or highest average growth rate of the stand in the units specified.

Fuelwood Production: 4 to 7 cords per acre for stands averaging 5 inches in diameter at 1 foot height with a medium canopy cover. There are about 274,000 gross BTUs 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 20.6 million BTUs of heat value in a cord of Utah juniper fire wood.
Posts (7 foot): About 15 posts per acre in stands of medium canopy.

Christmas Trees: About 5 trees per acre in stands of medium canopy. About 10 trees per acre in stands of sapling

stage.

MANAGEMENT GUIDES AND INTERPRETATIONS

1. LIMITATIONS AND CONSIDERATIONS
a. Potential for sheet and rill erosion is moderate to severe depending on slope.
b. Moderate 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 juniper forest.

2. ESSENTIAL REQUIREMENTS
a. Adequately protect from wildfire.
b. Protect soils from accelerated erosion.
c. Apply proper grazing management.

3. SILVICULTURAL PRACTICES
Silvicultural treatments are not reasonably applied on this site due to poor site quality and severe limitations for equipment and tree harvest.

Other products

Other important uses for pinyon pine are for Christmas trees and as a source of nuts for wildlife and human food. 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.

Utah juniper berries have been used by Indians for food.

Other information

Stansbury cliffrose is recommended for wildlife, roadside, construction, and mine spoils plantings; and for restoring pinyon-juniper woodland, mountain brushland, basin big sagebrush grassland, black sagebrush, and black greasewood communities. It can be established on disturbed seedbeds by broadcast seeding, drill seeding, or transplanting. Fall or winter seeding is recommended.
Because of its wide adaptation, ease of establishment, and economic value, blue grama is used extensively for conservation purposes, rangeland seeding, and landscaping. Blue grama is useful for reclamation and for erosion control in arid and semiarid regions.

Table 5. 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
Utah juniper	*JUOS*	35	55	3	5	–	–	–	
singleleaf pinyon	*PIMO*	35	55	3	5	–	–	–	

Type locality

Location 1: Clark County, NV	
Township/Range/Section	T27S R61E S32
General legal description	North-facing mountain sideslopes, about 3 1/2 miles south of McCullough Mountain, McCullough Range, Clark County, 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).

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

Jordan, M. 1974. An Inventory of Two Selected Woodland Sites in the Pine Nut Hills of Western Nevada. Master's Thesis, UNR Reno.

USDA-NRCS. 1998. National Forestry Manual - Part 537. Washington, D.C.

Contributors

BLS

Approval

Kendra Moseley, 4/25/2024

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	04/02/2020
Approved by	Kendra Moseley
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:**

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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:**
