USDA Natural Resources
Conservation Service

Ecological site F030XC235NV
Steep Shallow Metamorphic Mesic Mountains

Last updated: 4/25/2024
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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.

Ecological site concept

This forest site occurs on mountain summits and sideslopes on all aspects. Slopes range from 15 to over 75 percent, but slopes of 30 to 50 percent are most typical. Elevations range from 6000 to about 7500 feet. The soils associated with this site are typically shallow to bedrock and well drained. These soils have formed in residuum and colluvium from limestone or dolomite parent material and the soils are calcareous. The name does not seem to match the description.

Please refer to group concept F030XC252NV to view the provisional STM.

Associated sites

F030XC236NV	**Pinus monophylla/Quercus gambelii-Symphoricarpos longiflorus/Poa fendleriana** Pinyon site at higher elevations.

Similar sites

F030XC243NV	**Pinus monophylla-Juniperus osteosperma/Purshia stansburiana-Artemisia nova/Bouteloua gracilis** Pinyon-juniper site occurs on the backslopes of rock pediments. Stansbury's cliffrose prevalent.
F030XC244NV	**Pinus monophylla-Juniperus osteosperma/Cercocarpus ledifolius var. intermontanus/Bouteloua gracilis** Pinyon-juniper site, higher understory production, deeper soils, occurs on fan remnants.
F030XC247NV	**Pinus monophylla-Juniperus osteosperma/Cercocarpus ledifolius-Artemisia nova/Bouteloua gracilis** Pinyon-juniper site occurs on the backslopes of rock pediments. Curlleaf mountainmahogany prevalent.

Table 1. Dominant plant species

Tree	(1) *Pinus monophylla* (2) *Juniperus osteosperma*
Shrub	(1) *Artemisia nova* (2) *Amelanchier utahensis*
Herbaceous	(1) *Poa fendleriana*

Physiographic features

This forest site occurs on mountain summits and sideslopes on all aspects. Slopes range from 15 to over 75 percent, but slopes of 30 to 50 percent are most typical. Elevations range from 6000 to about 7500 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountain (2) Mountain slope
Elevation	6,000–7,500 ft
Slope	15–75%
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 ranges from 10 to over 14 inches in some areas. Mean annual air temperature is 51 to 56 degrees F. The average growing season is about 130 to 180 days.
There are no available climate stations for this site.

Table 3. Representative climatic features

Frost-free period (average)	180 days
Freeze-free period (average)	
Precipitation total (average)	14 in

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site are typically shallow to bedrock and well drained. These soils have formed in residuum and colluvium from limestone or dolomite parent material and the soils are calcareous. Available water capacity is 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 high and potential for sheet and rill erosion is moderate to severe depending on slope. The soil temperature regime is mesic and the soil moisture regime is aridic, bordering on ustic. Soil series associated with this soil include Seralin.

Table 4. Representative soil features

Surface texture	(1) Extremely gravelly very fine sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate
Soil depth	14–20 in
Surface fragment cover <=3"	50–70%
Surface fragment cover >3"	5–15%
Available water capacity (0-40in)	1.2–1.3 in
Calcium carbonate equivalent (0-40in)	20–30%

Electrical conductivity (0-40in)	2–8 mmhos/cm
Sodium adsorption ratio (0-40in)	1–5
Soil reaction (1:1 water) (0-40in)	7.9–8.4
Subsurface fragment volume <=3" (Depth not specified)	19–65%
Subsurface fragment volume >3" (Depth not specified)	5–15%

Ecological dynamics

Please refer to group concept F030XC252NV to view the provisional STM.

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.
Wildfire is recognized as a natural disturbance that strongly influenced the structure and composition of the climax vegetation of this forest site.

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.

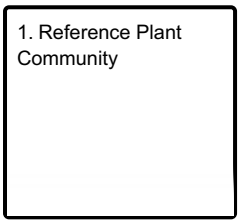
Immature Forest: The visual aspect and vegetal structure are dominated by singleleaf pinyon trees greater than 4.5 feet in height. The upper crown of dominant and co-dominant trees are cone or pyramidal shaped. Seedling and saplings of pinyon and Utah juniper are present in the understory. Dominants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

Mature Forest: The visual aspect and vegetal structure are dominated by singleleaf pinyon 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 are typically either irregularly or smoothly flat-topped or rounded. Tree canopy cover ranges from 20 to about 30 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 forests. This stage of community development is assumed to be representative of this forest site in the pristine environment.

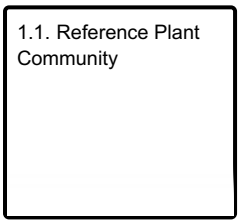
Over-Mature Forest: In the absence of wildfire or other naturally occurring disturbances, the tree canopy on this site can become very dense. This stage is dominated by singleleaf pinyon that have reached maximal heights for the site. Dominant and co-dominant trees average greater than five inches in 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

Ecosystem states



State 1 submodel, plant communities



State 1
Reference Plant Community

Community 1.1
Reference Plant Community

The reference plant community has an overstory canopy cover of about 30 percent. This is assumed to be representative of tree dominance on this site in the pristine environment. The representative plant community is dominated by singleleaf pinyon and Utah juniper. Overstory tree canopy composition is about 55 to 75 percent singleleaf pinyon and 25 to 45 percent Utah juniper.

Forest overstory. Mature Forest: 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 ann Utah juniper are typically either irregularly or smoothly flat-topped or rounded. Tree canopy cover ranges from 20 to about 35 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 forest site in the pristine environment.

Forest understory. Black sagebrush, Utah serviceberry, and yellowleaf silktassel are the principal understory shrubs. Crested needlegrass and muttongrass are the most prevalent understory grasses. Understory vegetative composition is about 30 percent grasses, 5 percent forbs and 65 percent shrubs and young trees when the average overstory canopy is medium (20 to 35 percent). Average understory production ranges from 300 to 550 pounds per acre with a medium canopy cover. Understory production includes the total annual production of all species within 4.5 feet of the ground surface.

Table 5. Ground cover

Tree foliar cover	1-5%
Shrub/vine/liana foliar cover	5-30%
Grass/grasslike foliar cover	1-5%
Forb foliar cover	1-5%
Non-vascular plants	0%
Biological crusts	0%
Litter	5-20%
Surface fragments >0.25" and <=3"	50-70%
Surface fragments >3"	1-5%
Bedrock	0%
Water	0%
Bare ground	10-30%

Table 6. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	1-5%	1-5%	1-2%	1-2%
>0.5 <= 1	1-5%	1-5%	1-5%	1-2%
>1 <= 2	1-5%	5-20%	1-2%	–
>2 <= 4.5	5-10%	5-20%	–	–
>4.5 <= 13	10-30%	–	–	–
>13 <= 40	1-5%	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Additional community tables

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 avaible. Grazing management should be keyed to needlegrass 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. Feral horses will use this site during the summer and fall.

Hydrological functions

Runoff is high and potential for sheet and rill erosion is moderate to severe depending on slope.

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. Other important uses for this tree are for Christmas trees and as a source of nuts for wildlife and human food. These trees have provided Indians with food for centuries.

Productive Capacity
This forest community is of moderate low site quality for tree production. Site index ranges from 35 to 60. (Howell, 1940).

Productivity Class: 0

Fuelwood Production: 8 to 10 cords 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.

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.

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.

Posts (7 foot): About 25 to 40 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. 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 no 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+11 (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

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.
The berries of Utah juniper have been used by Indians for food.

Other information

Black sagebrush is an excellent species to establish on sites where management objectives include restoration or improvement of domestic sheep, pronghorn, or mule deer winter range.
Utah serviceberry has been used to revegetate big game winter range and for surface stabilization. It grows slowly from seed and therefore transplanting may be more successful than seeding for revegetation projects.

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	*PIMO*	35	60	3	6	–	–	–	

Type locality

Location 1: Clark County, NV	
Township/Range/Section	T16 S. R71 E. S15 NW
Latitude	36° 32′ 47″
Longitude	114° 3′ 10″
General legal description	Approximately 2 miles north of Whitney Ranch in the south end of the Virgin Mountains, Clark County, Nevada.

Other references

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Contributors

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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	05/10/2025
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:**

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):**

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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:**
