USDA Natural Resources Conservation Service

Ecological site F029XY078NV
Shallow Ashy Loam 12-16" P.Z. 12 to 16

Last updated: 2/20/2025
Accessed: 05/12/2025

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): 029X–Southern Nevada Basin and Range

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The Southern Nevada Basin and Range MLRA (29) represents the transition from the Mojave Desert to the Great Basin. It is cooler and wetter than the Mojave. It is warmer and typically receives more summer precipitation than the Great Basin. This area is in Nevada (73 percent), California (25 percent), and Utah (2 percent). It makes up about 26,295 square miles (68,140 square kilometers). Numerous national forests occur in the area, including the San Bernardino, Angeles, Sequoia, Inyo, Humboldt-Toiyabe, and Dixie National Forests. Portions of Death Valley National Monument, the Nuclear Regulatory Commission’s Nevada Test Site, the Hawthorne Ammunition Depot, and the Nellis Air Force Range in Nevada and the China Lake Naval Weapons Center in California also are in this MLRA. The northeast part of the Paiute Indian Reservation and the southern third of the Walker River Indian Reservation are in the part of this MLRA in Nevada, and the Lone Pine, Fort Independence, and Big Pine Indian Reservations are in the part in California.

Physiography:
The entire area is in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus. The area of broad, nearly level, aggraded desert basins and valleys between a series of mountain ranges trending north to south. The basins are bordered by sloping fans and pluvial lake terraces. The mountains are uplifted fault blocks with steep side slopes and not well dissected due to limited annual precipitation. Most of the valleys in this MLRA are closed basins or bolsons containing sinks or playa lakes.

Geology:
The mountains are dominated by Pliocene and Miocene andesite and basalt rocks, Paleozoic and Precambrian carbonate rocks prominent in some areas. Scattered outcrops of older Tertiary intrusives and very young tuffaceous sediments (Pliocene and Miocene) are in the western and eastern thirds of this MLRA. The valleys consist mostly of alluvial fill and playa deposits at the lowest elevations in the closed basins.

Climate:
The average annual precipitation is 3 to 12 inches (75 to 305 millimeters) in most of this area. It may be as high as 29 inches (735 millimeters), on the higher mountain slopes. Most of the rainfall occurs as high-intensity, convective thunderstorms during the growing season. Summers are dry, but sporadic storms are common in July and August.

Water Resources:
Water resources are scarce. Ground water and surface water sources are limited. Streams are small and intermittent. Quality of surface water in naturally degraded as streams cross area of valley fill effected by dissolved salts. Irrigation water may raise the levels of dissolved salts and suspended sediments causing contamination.

Soils:
Dominant soil orders include Entisols and Aridisols.

Classification relationships

Society of American Foresters (SAF) cover type 239.
US National Vegetation Classification (USNVC): 1 Forest and Woodland, 1.C Temperate Forest, 1.C.2 Cool Temperate Forest, D1010 Western North American Cool Temperate Woodland and Scrub, M026 Intermountain Singleleaf Pinyon- Western Juniper Woodland, G247 Great Basin Pinyon- Juniper Woodland Group. The closest NVC associations are as follows: CEGL005436 PIMO-JUOS/ARTRV- Mixed Shrub Woodland (Community Phase 1.1 and 1.5), CEGL000837 PIMO-JUOS-QUGA/ARTR2 Woodland (Community Phase 1.3 and 1.4).

Ecological site concept

The Shallow Ashy Loam 12-16" P.Z. occurs on mountain sideslopes of mostly northerly aspect at the lower elevations of its range and on all aspects at higher elevations. Slopes range from 15 to over 75 percent, but typically range from 30 to 70 percent. Elevations are 4500 to about 7000 feet. Soils are typically shallow, have rocks distributed throughout the profile, and are well drained. There are high amounts of rock fragments at the soil surface.

The Shallow Ashy Loam 12-16" P.Z. was previously known as PIMO-JUOS/ARTRV-AMUT-QUERC 12 to 16.

Associated sites

R029XY163NV	**COBBLY CLAYPAN 12-14 P.Z.** Low sagebrush-Utah serviceberry/Fendler's bluegrass
R029XY164NV	**GRAVELLY CLAY SLOPE 12-14 P.Z.** Mountain big sagebrush-Utah serviceberry/Fendler's bluegrass
F029XY086NV	**Rocky Loamy Slope 16+** Found on deeper soil.

Similar sites

F029XY084NV	**PIMO-JUOS WSG 0R0501 12 to 16** PIMO-JUOS/ARTRV-AMUT-QUGA
F029XY145NV	**PIMO-JUOS WSG: 0R0504 10 to 14** PIMO-JUOS/ARNO4-PUST
F029XY066NV	**PIMO-JUOS WSG 1R0501 12 to 16** PIMO-JUOS/ATRTV/POFE
F029XY135NV	**PIMO-JUOS WSG: 0R0507 10 to 14** PIMO-JUOS/ARNO4-AMUT-GAFL2
F029XY083NV	**PIMO-JUOS WSG 0X0504 12 to 16** PIMO-JUOS/ARNO4-QUGA/POFE
F029XY067NV	**PIMO-JUOS WSG 0R0501 12 to 16** PIMO-JUOS/ARTRV-AMUT-GAFL2
F029XY069NV	**PIMO-JUOS WSG 0R0504 12 to 16** PIMO-JUOS/ARNO4/POFE
F029XY111NV	**PIMO-JUOS WSG 0R0507 12 to 16** PIMO-JUOS/CEMOG2-GAFL2/POFE
F029XY095NV	**PIMO-JUOS WSG 0R0501 12 to 16** PIMO-JUOS/ARTRV/POFE less productive than 029XY066NV
F029XY065NV	**PIMO-JUOS/ARTRW8** PIMO-JUOS/ARTRW8/POA
F029XY068NV	**PIMO-JUOS/ARAR8** PIMO-JUOS/ARAR8-AMUT

Table 1. Dominant plant species

Tree	(1) *Pinus monophylla* (2) *Juniperus osteosperma*
Shrub	(1) *Artemisia tridentata ssp. vaseyana* (2) *Amelanchier utahensis*
Herbaceous	(1) *Poa fendleriana*

Physiographic features

The Shallow Ashy Loam 12-16" P.Z. occurs on mountain sideslopes of mostly northerly aspect at the lower elevations of its range and on all aspects at higher elevations. Slopes range from 15 to over 75 percent, but typically range from 30 to 70 percent. Elevations are 4500 to about 7000 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountain (2) Hill
Runoff class	High to very high
Flooding frequency	None
Ponding frequency	None
Elevation	1,372–2,134 m
Slope	30–70%
Water table depth	183 cm
Aspect	Aspect is not a significant factor

Climatic features

The climate is largely influenced by topographical barriers. The Sierra Nevada mountains drain much of the moisture from storms moving from the Pacific. The Rocky Mountains divert cold air masses from the Great Basin. This area also lies in the path of the warm, moist air masses from the Gulf of Mexico. Consequently eastern Nevada can expect an average of 20 to 25 thunderstorm days per year, mostly during July through September. As much as 25 percent of the average annual precipitation occurs from July through September. The climate is considered cool continental with warm, moist summers and cold, wet winters.
Average annual precipitation is 12 to 16 inches. Mean annual air temperature is 46 to 52 degrees F. The average frost-free period is 120 to 160 days.

There are no climate station located in the site.

Table 3. Representative climatic features

Frost-free period (average)	160 days
Freeze-free period (average)	
Precipitation total (average)	406 mm

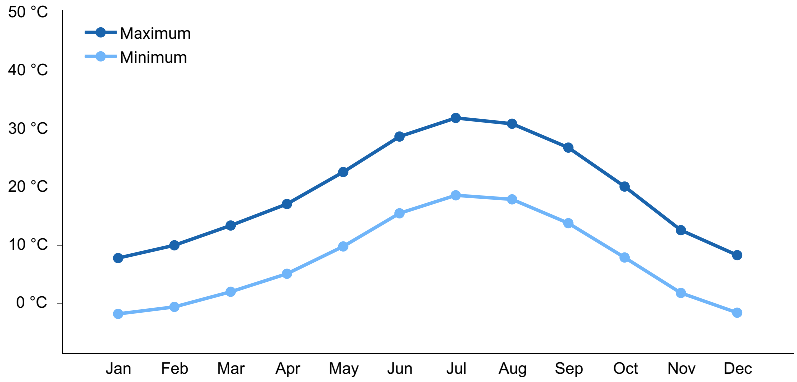


Figure 1. Monthly average minimum and maximum temperature

Influencing water features

There are no influencing water features associated with this site.

Soil features

Soils are typically shallow and well drained. These soils are skeletal with 35 to over 50 percent gravels, cobbles or stones, by volume, distributed throughout the profile. 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 at the soil surface which occupy plant growing space, yet help to reduce evaporation and conserve soil moisture. Surface rock fragments are predominantly gravels, with up to 10 percent cobbles. Runoff is medium to rapid and potential for sheet and rill erosion is moderate to severe depending on slope. Soil temperature regime is mesic and soil moisture regime is aridic boarding on ustic. Official soil series correlated to this ecological site include Thunderbird and Turba, a loamy-skeletal, mixed, superactive, mesic shallow Vitritorrandic Argiustoll.

Table 4. Representative soil features

Parent material	(1) Colluvium–welded tuff
Surface texture	(1) Very gravelly sandy loam (2) Very cobbly sandy loam (3) Very gravelly loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Very slow to moderately slow
Soil depth	36–51 cm
Surface fragment cover <=3"	20–45%
Surface fragment cover >3"	10–15%
Available water capacity (0-101.6cm)	3.81–11.43 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	6.1–7.8
Subsurface fragment volume <=3" (Depth not specified)	36–50%

Subsurface fragment volume >3" (Depth not specified)	2–10%

Ecological dynamics

The plant community phases are dynamic in response to changes in disturbance regimes and weather patterns. In general, pinyon-juniper forests have an open canopy with a low producing shrub understory. Fire plays an important role in all forest ecosystems. Important processes regulated by fire include regeneration and reproduction, seedbed preparation, competition reduction and thinning to maintain stand health (Spurr and Barnes 1964). Individual trees on this site are likely greater than 200 years old, indicating that stand replacing disturbances are uncommon. Total vegetative cover is high due to the diverse understory, although the tree cover remains quite low. Pinyon and juniper commonly grow together, but juniper species are considered to exhibit higher drought tolerance. Juniper tends to dominate the lower elevations of their range and community structure shifts to pinyon with increasing elevation (Zouhar 2001).

Soils 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 pinyon and juniper forests, 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 wetter 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.

The distributions of pinyon and juniper forests have undergone many changes in prehistoric and historic times and these communities continue to change in modern times. It is also true that any assessment of pinyon and juniper distribution is only a snapshot of a plant community in motion (Zouhar 2001). Expansions in the spatial extent of pinyon-juniper communities in recent times have been contributed to many variables including distribution by birds, centuries of livestock grazing, changes in fire frequency and climate change. Currently pinyon-juniper forests are defined as being dominated by pre-settlement trees, those that established prior to 1860. Trees that established after the rapid settlement of the West in the late 1860's and 1870's are defined as post-settlement (Miller et al. 1999). True old-growth pinyon-juniper forests should be defined on the basis of tree age, and stand structure and function (Miller et al. 1999).

Old forests usually differ in structure and function from young forests, however wildlife studies have generally not separated postsettlement from presettlement pinyon-juniper forests. Age of individual trees is used to separate pre- and postsettlement forests. Old growth can also be based on the structural characteristics of the tree. With age, trees develop broad asymmetrical tops and rounded canopies. Old trees also exhibit deeply furrowed bark, twisted trunks or branches, dead branches, large lower limbs, hollow trunks, large diameter to height ratios and bright yellow lichens on the branches. Western and Utah juniper can attain ages 1,000 years and greater and pinyon 600 years (Bowns 1999). Fire policies influencing these old stands should be evaluated on an individual stand basis and should include both suppression and let burn.

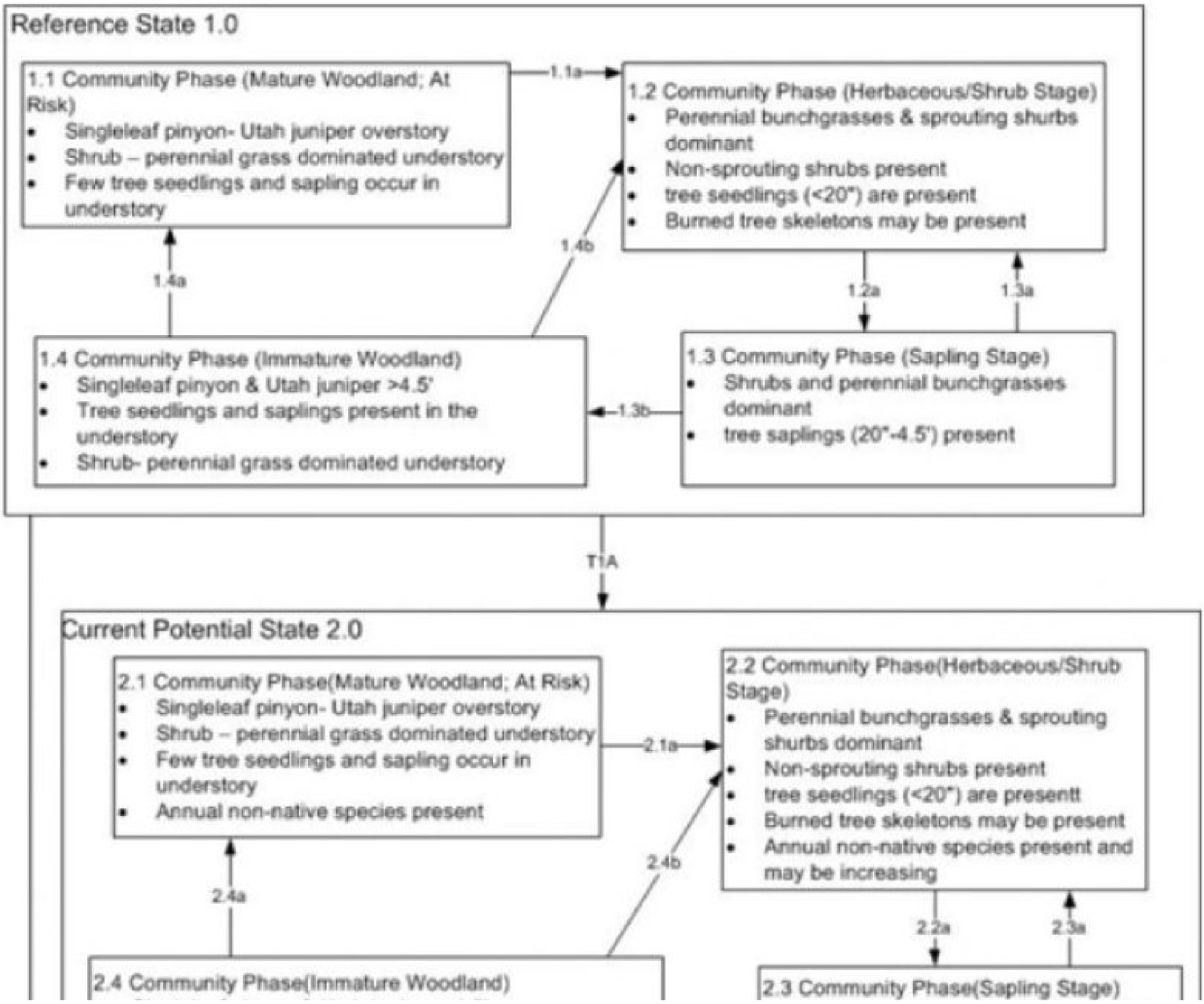
Fire Ecology:
Singleleaf pinyon and Utah juniper are highly susceptible to fire damage. Both have thin, highly flammable bark that provides little protection to the cambium and lack self-pruning branches. Generally pinyon-juniper forests occur on shallow, rocky soils, where fires are infrequent and unpredictable. Years with exceptional rainfall lead to increased herbaceous growth and allows for wildfires 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, intensity of fire, 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.

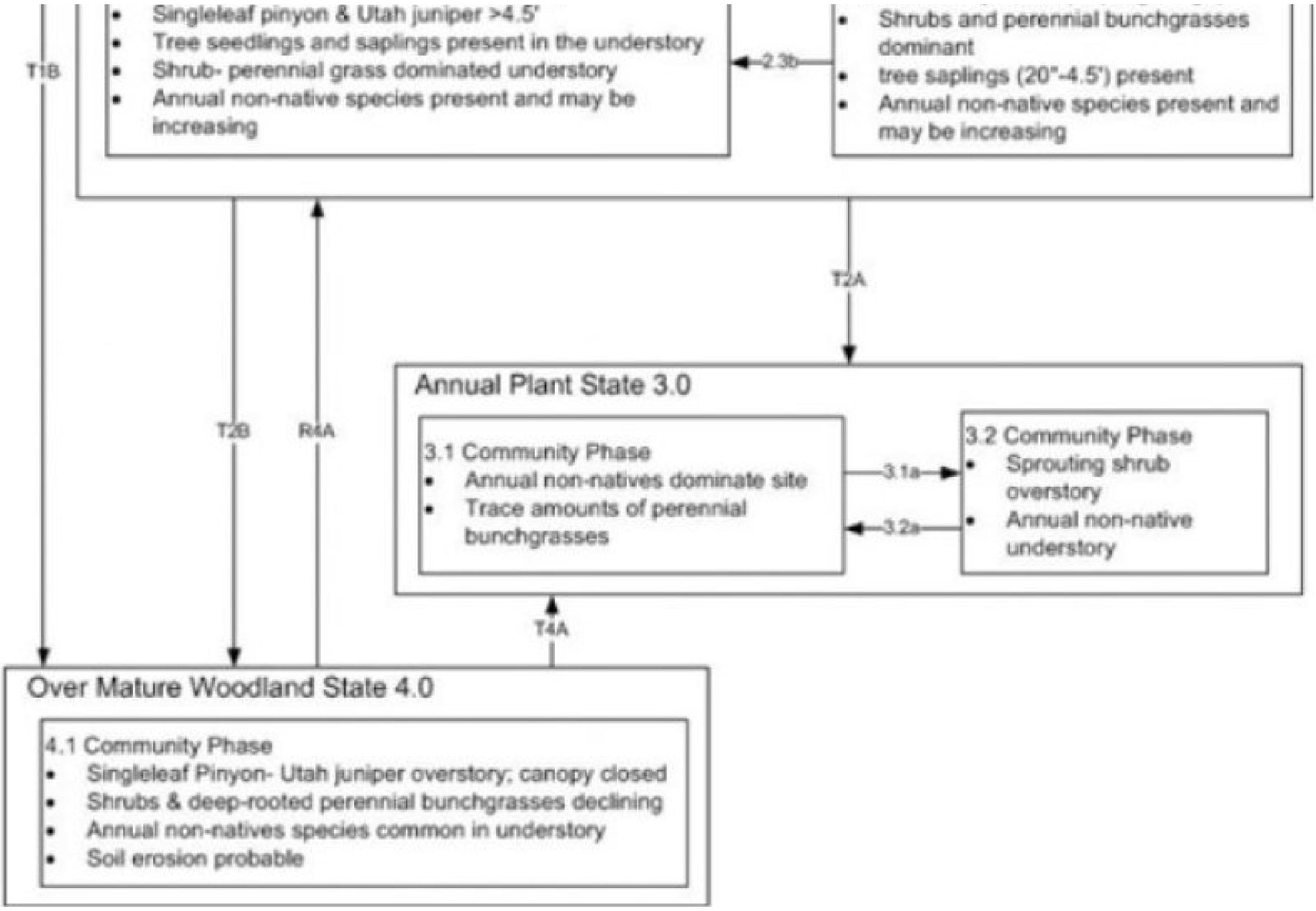
Reestablishment may take 50 to 100 years to reach pre-fire densities.

Mountain big sagebrush is highly susceptible to injury from fire. It is often top-killed by fire and will not resprout. Regeneration of sagebrush is dependent of favorable climatic conditions and a nearby seed source. Aboveground parts of Utah serviceberry may be killed or consumed under fire conditions with sufficient flame lengths. Utah serviceberry may be slightly harmed by fire, depending on moisture conditions, but is generally considered to be fire tolerant. Utah serviceberry sprouts from the root crown following fire. Soil moisture is important to aid sprouting. Fire effects to greenleaf manzanita vary with season, severity, and intensity and range from partial consumption to complete consumption of the aboveground plant. Greenleaf manzanita is dependent on fire for germination of its dormant, banked seed. Desert ceanothus is considered a weak sprouter. Seeds require scarification and generally germinate first spring following fire. Typically manzanita and ceanothus seedlings appear in large numbers the spring following fire (Hauser 2007 and Zouhar 2000). Gambel's oak and turbinella oak are fire adapted species capable of sprouting vigorously from the roots/rhizomes following fire. They also establish from seed. Snowberry is top killed by fire, but sprouts from the surviving root crown and rhizomes (McWilliams 2005).

Muttongrass is unharmed to slightly-harmed by light-severity fall fires. Muttongrass appears to be harmed by and slow to recover from severe fire. Indian ricegrass can be killed by fire, depending on severity and season of burn. It readily reestablishes on burned sites through seed dispersed from adjacent unburned areas. The small stature of prairie Junegrass and coarse textured foliage aid in protection of the meristematic tissue, it typically shows little to no damage following fire. Needle and thread is top-killed by fire. It may be killed if the aboveground stems are completely consumed. Needle and thread sprouts from the caudex following fire, if heat has not been sufficient to kill underground parts. Recovery usually takes 2 to 10 years.

State and transition model





Singleleaf pinyon & Utah juniper >4.5'
Tree seedlings and saplings present in the understory
Shrub- perennial grass dominated understory
Annual non-native species present and may be increasing
Shrubs and perennial bunchgrasses dominant
tree saplings (20"-4.5') present
Annual non-native species present and may be increasing
T1B
2.3b
T2A
T2B
R4A
Annual Plant State 3.0
3.1 Community Phase
Annual non-natives dominate site
Trace amounts of perennial bunchgrasses
3.1a
3.2a
3.2 Community Phase
Sprouting shrub overstory
Annual non-native understory
T4A
Over Mature Woodland State 4.0
4.1 Community Phase
Singleleaf Pinyon- Utah juniper overstory; canopy closed
Shrubs & deep-rooted perennial bunchgrasses declining
Annual non-natives species common in understory
Soil erosion probable

Reference State 1.0 Community Pathways
1.1a: Fire
1.2a: Time and lack of disturbance
1.3a: Fire
1.3b: Time and lack of disturbance
1.4a: Time and lack of disturbance
1.4b: Fire

T1A: Introduction of non-native annual species
T1B: Time and lack of disturbance

Current Potential State 2.0 Community Pathways
2.1a: Fire
2.2a: Time and lack of disturbance
2.3a: Fire
2.3b: Time and lack of disturbance
2.4a: Time and lack of disturbance
2.4b: Fire

T2A: Severe and Repeated Fire
T2B: Time and lack of disturbance

Annual State 3.0 Community Pathways
3.1a: Time allows for sprouting shrubs to recover
3.2a: Fire

T3A: Fire

Over Mature Woodland State 4.0 Community Pathways

R4A: Thinning of trees and seeding or recovery of understory species

T4A: Severe and Repeated Fire

Animal community

Livestock Interpretations:
This site is suited to cattle and sheep grazing where terrain permits. Grazing management should be keyed to dominant forage production. Muttongrass is highly nutritious and remains palatable throughout the grazing season. Needlegrasses and Indian ricegrass provide palatable, nutritious feed during the late spring and early summer. Grazing practices should allow for ample seed production and seedling establishment by perennial bunchgrasses. Shrubs provide additional browse for domestic livestock. Many areas are not used because of steep slopes and lack of adequate water sources.
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.

Selection of initial stocking rates for given grazing units is a planning decision. This decision should be made ONLY after careful consideration of the total resources available, evaluation of alternatives for use and treatment, and establishment of objectives by the decisionmaker.

Wildlife Interpretations:
This site has high value for mule deer during the winter. Juniper 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. Pinyon-juniper forests provide food, cover and nesting habitat for species of migratory birds, cavity nesters and ground nesters. It is also used by various song birds, small mammals (Great Basin pocket mouse and wood rats), reptiles (rattlesnakes and striped whipsnake) and associated predators natural to the area.

Hydrological functions

The hydrologic cover condition of this site is fair in a representative stand. The average runoff curve is about 85 for group C soils and about 90 for group D. Soils.

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

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.

CMAI*: 4.8 to 7.4 ft3/ac/yr;
0.34 to 0.52 m3/ha/yr.
Culmination is estimated to be at 70 to 90 years.
*CMAI: is the culmination of mean annual increment or highest average growth rate of the stand in the units specified.

Fuelwood Production: 7 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 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 21 million BTUs of heat value in a cord of mixed pinyon pine and Utah juniper.

Posts (7 foot): About 25 to 50 posts per acre in stands of medium canopy.

Christmas trees: 15 trees per acre per year in stands of medium canopy. Twenty-five trees per acre in stands of sapling stage.

Pinyon nuts: Production varies year to year, but mature woodland stage can yield about 300 pounds per acre in favorable years.

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 sites having extreme surface stoniness.
c. Proper spacing is the key to a well managed, multiple use and multi-product pinyon-juniper forestland.

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

3. SILVICULTURAL PRACTICES
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+11
b. Prescription burning program to maintain desired canopy cover and manage site reproduction.
c. Fire hazard - Fire usually not a problem in well-managed, mature stands.

Other products

Other important uses for this tree are for Christmas trees and as a source of nuts for wildlife and human food. Thousands of pounds of nuts are gathered each year and sold on commercial markets throughout the United States.

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
singleleaf pinyon	*PIMO*	10	20	5	7	92	–	–	
singleleaf pinyon	*PIMO*	55	80	5	7	92	–	–	

Inventory data references

NASIS data used to complete abiotic narratives and tables.

Type locality

Location 1: Lincoln County, NV	
Township/Range/Section	T7S R69E S24
General legal description	South of East Pass area, Clover Mountains, Lincoln County, Nevada. This site also occurs in Clark County and southern Lincoln County, Nevada.

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Contributors

RRK/GKB

Approval

Kendra Moseley, 2/20/2025

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	05/12/2025
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):**

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:**