USDA Natural Resources
Conservation Service

Ecological site F029XY086NV
Rocky Loamy Slope 16+

Last updated: 2/20/2025
Accessed: 02/24/2025

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

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.

Ecological site concept

The Rocky Loamy Slope 16+ site occurs on mountain sideslopes of mostly northerly aspects at the lower elevations of its range and on all aspects at higher elevations. Slopes range from 30 to over 75 percent, but are typically 30 to 50 percent. Elevations are 6,200 to about 7,600 feet. Soils are typically deep to bedrock and well drained.

The Rocky Loamy Slope 16+ was previously known as PIPOS/ARPA6/POFE.

Associated sites

F029XY078NV	**Shallow Ashy Loam 12-16" P.Z. 12 to 16** Site is found on shallow soils.

Table 1. Dominant plant species

Tree	(1) *Pinus ponderosa var. scopulorum*
Shrub	(1) *Arctostaphylos patula* (2) *Quercus gambelii*
Herbaceous	(1) *Poa fendleriana*

Physiographic features

The Rocky Loamy Slope 16+ site occurs on mountain sideslopes of mostly northerly aspects at the lower elevations of its range and on all aspects at higher elevations. Slopes range from 30 to over 75 percent, but are typically 30 to 50 percent. Elevations are 6200 to about 7600 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountain slope
Runoff class	High
Flooding frequency	None
Ponding frequency	None
Elevation	6,200–7,600 ft
Slope	30–75%
Water table depth	72 in
Aspect	Aspect is not a significant factor

Climatic features

The climate is cool continental with warm, moist winters and cold, wet winters. Average annual precipitation is 16 to over 20 inches. Mean annual air temperature is 42 to 46 degrees F. The average frost-free period is 80 to 100 days.

No climate stations associated with the site.

Table 3. Representative climatic features

Frost-free period (average)	100 days
Freeze-free period (average)	
Precipitation total (average)	20 in

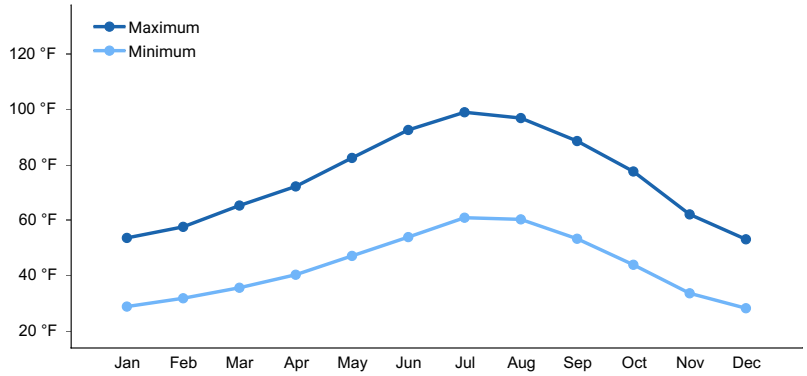


Figure 1. Monthly average minimum and maximum temperature

Influencing water features

There are no influencing water features associated with this site.

Soil features

Soils are typically deep to bedrock and well drained. These soils have formed in residuum and colluvium from volcanic rocks with a strong influence of volcanic ash. The soils have an organic horizon to one-inch thick. Soil reaction is neutral. Available water capacity is very low to moderate. Runoff is medium and potential for sheet and rill erosion is moderate to severe depending on slope. The soil temperature regime is mesic and soil moisture regime is typic xeric. A mollic epipedon occurs from 8 to 50 inches. The soil series associated with this site is Faleria, an ashy-skeletal, glassy, frigid, Vitrandic Haplustalf.

Table 4. Representative soil features

Parent material	(1) Residuum–volcanic rock (2) Colluvium–volcanic rock
Surface texture	(1) Gravelly sandy loam (2) Very cobbly loam (3) Gravelly sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate
Soil depth	40–60 in
Surface fragment cover <=3"	15–20%
Surface fragment cover >3"	5–10%
Available water capacity (0-40in)	2.9–5.5 in
Calcium carbonate equivalent (0-40in)	0%
Electrical conductivity (0-40in)	0 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	6.8–7.2
Subsurface fragment volume <=3" (Depth not specified)	20–45%

Subsurface fragment volume >3" (Depth not specified)	5–35%

Ecological dynamics

The plant communities are dynamic in response to changes in disturbance regimes and weather patterns. Fire plays 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, 1973). Rocky Mountain ponderosa pine is found throughout the West and grows on discontinuous mountains, plateaus, and canyons. Investigation to the vast genetic diversity of P. ponderosa suggests there are five major geographic races, including two distinct races in variety scopulorum. Northern sources of variety scopulorum are characterized by relatively good growth and frost resistance. Rocky Mountain ponderosa pine has migrated into the Great Basin following the ice ages by way of the Southern Rocky Mountains. Rocky Mountain ponderosa pines never attain the size of the typical variety (P. ponderosa var. ponderosa).

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. Seedlings of ponderosa pine grow best with warm days and warm nights. Root growth of ponderosa pine is highly dependent on soil temperature. Low soil temperatures result in low metabolic activity and membrane permeability which limit water and nutrient uptake (Spurr and Barnes, 1973).

Biogeochemical cycling in semi-arid forest system is controlled by moisture availability and fire. The role of water is more important in humid systems, which are largely affected by leaching. Nitrogen is considered to be a limiting nutrient in this system and the plant community will rapidly respond to inputs of nitrogen. Temporary increases in available nitrogen decrease to pre-burn levels within 5 to 12 years after fire (Johnson et al., 1998).

Ponderosa pine is shade intolerant and becomes more shade intolerant with age. The successional status of Ponderosa pine can be expressed in terms of its successional role, which ranges from seral to climax depending on specific site conditions. It plays a climax role on sites toward the extreme limits of its environmental range and becomes increasingly seral with more favorable conditions. On sites with more favorable moisture, pine encounters greater competition and must establish itself opportunistically. On such sites, establishment is likely to be highly dependent upon the cyclical nature of large seed crops and favorable weather conditions.

Fire Ecology:
Rocky Mountain ponderosa pine is considered very resistant to fire. This species has evolved with frequent fires of mixed severity. Surface fires reoccurred every 5 to 30 years, this maintained open-growth, park-like stands. Stand replacing fires were less common, estimates range from 60 to 160 years.

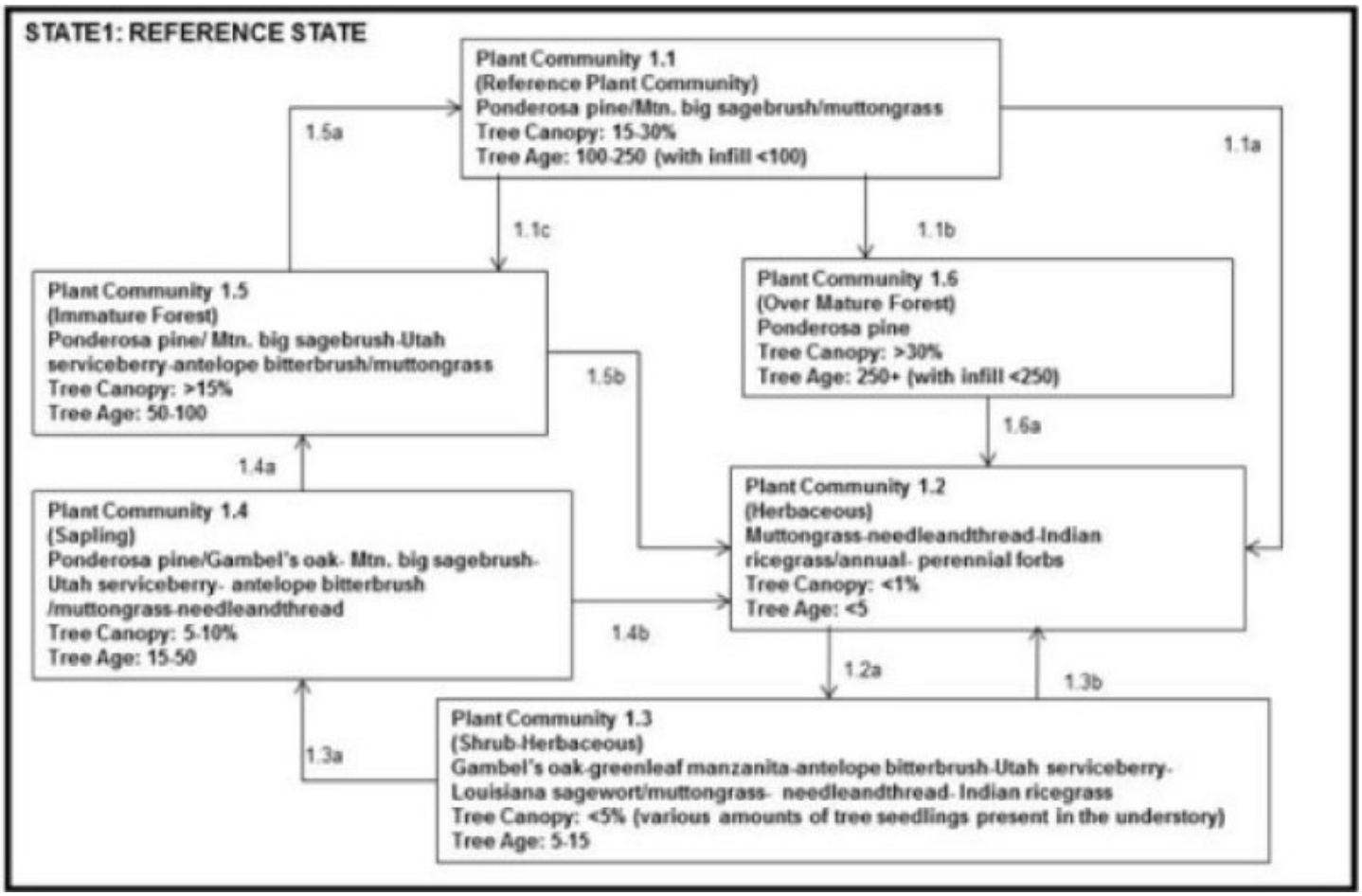
Under pristine conditions fire creates openings for seedling establishment, thus maintaining its persistence. These fires also thinned saplings and maintained the relatively open understories. Ponderosa pine is fire-adapted in all stages of its life history and is especially well adapted to light, regular surface fires. The seeds prefer openings with mineral soil usually prepared by fire for seedbed. For the seedlings and young trees, early development of insulative bark, shielded meristems, high moisture content in living needles, and rapid extension of taproots reduce their mortality from fire. For mature trees, thick bark, deep roots, and low- flammability crown structures help them survive most fires.

Greenleaf manzanita is top killed by low to moderate severity fire. It can reestablish by sprouting from dormant buds in the root burl or from fire-stimulated germination of residual seeds in the soil. 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. Mountain big sagebrush is highly susceptible to injury from fire. It is often completely killed by fire and will not resprout. Antelope bitterbrush is highly susceptible to fire kill. Some ecotypes sprout following fire, either from dormant buds encircling an aboveground root crown, from calluses of meristematic tissue beneath the bark, or from dormant buds on a belowground lignotuber. It also regenerated from off-site seed. Muttongrass is unharmed to slightly harmed by light-severity fall fires. Muttongrass appears to be harmed by and slow to recover from severe fire. Bottlebrush

squirreltail's small size, coarse stems, and sparse leafy material aid in its tolerance of fire. Postfire regeneration occurs from surviving root crowns and from on- and off-site seed sources. Frequency of disturbance greatly influences postfire response of bottlebrush squirreltail. Undisturbed plants within a 6 to 9 year age class generally contain large amounts of dead material, increasing bottlebrush squirreltail's susceptibility to fire.

The reference state is representative of the natural range of variability under pristine conditions. It is dominated by Rocky Mountain ponderosa pine with possible traces of pinyon pine in the canopy. Primary natural disturbances affecting this ecological site are wildfire, disease, insect attack and periodic drought. Timing of fire combined with weather events determines plant community dynamics. Increased mortality following drought is likely caused by a combination of insect attack and disease.

State and transition model



1.1a - Standing replacing fire or other major disturbance (to plant community 1.2).

1.1b - Time and absence of disturbance allows canopy cover to increase (to plant community 1.6).

1.1c - Thinning or partial harvest, partial mortality from pest attack or other large-scale disturbance (to plant community 1.5)

1.2a - Absence from disturbance and natural regeneration over time (to plant community 1.3).

1.3a - Absence from disturbance and natural regeneration over time (to plant community 1.4).

1.3b - Stand replacing fire or other large-scale disturbance (to plant community 1.2).

1.4a - Absence from disturbance and natural regeneration over time (to plant community 1.5).

1.4b - Stand replacing fire or other large disturbance (to plant community 1.2).

1.5a - Absence from disturbance, seedling and sapling growth and natural regeneration over time (to plant community 1.1).

1.5b – Large-scale disturbance such as, stand replacing fire, total harvest, insect attack (to plant community 1.2).

1.6a - Stand replacing fire, severe insect attack or other large disturbance (to plant community 1.6).

Animal community

Livestock Interpretations:
This site is suited to cattle and sheep grazing during the summer and fall. 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. Attentive grazing management is required due to steep slopes and erosion hazard.
Grazing management should be keyed to palatable shrub and perennial grass production. Muttongrass is highly nutritious and remains palatable throughout the grazing season. Muttongrass is excellent forage for domestic livestock especially in the early spring. Muttongrass begins growth in late winter and early spring, which makes it available before many other forage plants. New plants of muttongrass are established entirely from seed and grazing practices should allow for ample seed production and seedling establishment.
Sandberg bluegrass is a widespread forage grass. It is one of the earliest grasses in the spring and is sought by domestic livestock and several wildlife species. Sandberg bluegrass is a palatable species, but its production is closely tied to weather conditions. It produces little forage in drought years, making it a less dependable food source than other perennial bunchgrasses.
Harvesting trees under a sound management program for can open up the tree canopy to allow increased production of understory species desirable for grazing.
Bottlebrush squirreltail is very palatable winter forage for domestic sheep of Intermountain ranges. Domestic sheep relish the green foliage. Overall, bottlebrush squirreltail is considered moderately palatable to livestock.
Sedge provides good to fair forage for domestic grazing. Pointleaf manzanita provides food and cover for livestock. Domestic goats prefer pointleaf manzanita browse. Utah serviceberry provides good browse for domestic sheep and domestic goats. In the spring, Utah serviceberry provides fair forage for cattle and good to excellent browse for domestic sheep and goats. Utah serviceberry provides good forage late in winter and in early spring, because it leafs out and blooms earlier than associated species. Mountain big sagebrush is eaten by domestic livestock but has long been considered to be of low palatability, and a competitor to more desirable species. Antelope bitterbrush is important browse for livestock. Domestic livestock and mule deer may compete for antelope bitterbrush in late summer, fall, and/or winter. Cattle prefer antelope bitterbrush from mid-May through June and again in September and October. Snowberry is readily eaten by all classes of livestock, particularly domestic sheep. Some livestock (domestic goats, sheep, and cattle) use it in spring, fall, and/or winter but rarely in the summer.

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.

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.

Wildlife Interpretations:
This site has moderate value for mule deer during the summer and fall. Upland game species including rabbits, sage grouse, blue and ruffed grouse use it. Various songbirds, rodents, reptiles and associated predators natural to the area, also use it. Feral horses will use this site during the summer and fall. Manzanita provides food and cover for wildlife. Many frugivorous animals eat the berries, including blue grouse, Gambel's quail, mule deer, American black bears, coyotes and skunks. Palatability of manzanita is considered "low" for deer species. Manzanita stands are considered excellent cover for deer and desert bighorn sheep. Utah serviceberry is a very important species for mule deer in the Great Basin. Porcupines and desert bighorn sheep also use Utah serviceberry. Utah serviceberry fruit is preferred by many birds. It can be an important winter food for birds since berries stay on the shrub throughout the winter. Mountain big sagebrush is highly preferred and nutritious winter forage for mule deer and elk. Mule deer, elk, and bighorn sheep utilize antelope bitterbrush extensively. Mule deer use of antelope bitterbrush peaks in September, when antelope bitterbrush may compose 91 percent of the diet. Winter use is greatest during periods of deep snow. Antelope bitterbrush seed is a large part of the diets of rodents, especially deer mice and kangaroo rats. Snowberry is an important forage species for deer and elk on high elevation summer ranges. Snowberry is frequently one of the first species to leaf out, making it a highly sought after food in the early spring. Curlleaf mountain mahogany provides food and cover for a variety of wildlife species. Curlleaf mountain mahogany is highly palatable to deer. A variety of small mammals consume curlleaf mountain mahogany seeds. Deer and elk make heavy use of muttongrass, especially in early spring when other green forage is scarce. Depending upon availability of other nutritious forage, deer may use muttongrass in all seasons. Muttongrass cures well and is an important fall and winter deer food in some areas. Sandberg bluegrass is desirable for pronghorn antelope and mule deer in the spring and preferable in the spring, summer, and fall for elk and desirable as part of their winter range. Bottlebrush squirreltail is a dietary component of several wildlife species. Bottlebrush squirreltail may provide forage for mule deer and pronghorn. Sedges have a high to moderate resource value for elk and a medium value for mule deer. Elk consume beaked sedge later in the growing season.

Hydrological functions

The hydrologic cover condition of this site is fair in a representative stand. The average runoff curve is about 60 for group B soils. Runoff is medium. Permeability is moderate.

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

The wood of ponderosa pine is valuable for lumber. Although no longer harvested, the oleoresin, or pitch, of ponderosa pine has been a source of turpentine in the past (Lanner, 1984).

PRODUCTIVE CAPACITY

This forestland community is of low site quality for tree production. Site index ranges from 65 to 77 (Table 21, SCS, 190-V-NFM Amend. 3; from Meyer, 1938. USDA Tech. Bull. 630).

Productivity Class: 4
CMAI*: 50 to 60 ft3/ac/yr;
3.5 to 4.5 m3/ha/yr.

Culmination is estimated to be at 100 years.
*CMAI: is the culmination of mean annual increment or highest average growth rate of the stand in the units specified.

Fuelwood Production: 30 to 35 cords per acre for stands averaging 50 to 60 feet in height and 90 years of age with a medium canopy cover. There are about 213,750 gross British Thermal Units (BTUs) heat content per cubic foot of ponderosa pine wood. 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 16 million BTUs of heat value in a cord of ponderosa pine wood.

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

Tree Volume per Acre: For stands averaging 60 feet in height and 90 years of age:
SITE INDEX 65 = 4050 cu ft
SITE INDEX 77 = 5050 cu ft

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 forest.

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 trees for cone (fruit) 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
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

Rocky Mountain ponderosa pine, Pinus ponderosa var. scopulorum has migrated into the Great Basin following the ice ages by way of the Southern Rocky Mountains. Rocky Mountain ponderosa pine never attain the size of the typical variety (P. ponderosa var. ponderosa). The fascicles of this tree tend to have only two needles and the needles are shorter than the typical variety. The cones of Rocky Mountain ponderosa pine are also smaller then the typical variety (Lanner, 1984).
The wood of ponderosa pine is valuable for lumber. Although no longer harvested, the oleoresin, or pitch, of ponderosa pine has been a source of turpentine in the past. Pointleaf manzanita was an important food of some Southwest Native Americans. Utah serviceberry fruits were used by Native Americans and early European explorers in North America for food and medicine. Native Americans used big sagebrush leaves and branches for medicinal teas, and the leaves as a fumigant. Bark was woven into mats, bags and clothing.

Other information

Ponderosa pine is widely used for soil stabilization and watershed protection. Bareroot stock is used occasionally for planting on mine-spoils in the West. Bottlebrush squirreltail is tolerant of disturbance and is a suitable species for revegetation. 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. Antelope bitterbrush has been used extensively in land reclamation. Antelope bitterbrush enhances succession by retaining soil and depositing organic material and in some habitats and with some ecotypes, by fixing nitrogen. Mountain snowberry is useful for establishing cover on bare sites and has done well when planted onto roadbanks. Curlleaf mountain mahogany may be planted to help stabilize soil in disturbed areas such as roadcuts and mine spoils.

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
ponderosa pine	*PIPOS*	65	77	50	60	–	–	–	

Inventory data references

NASIS data used to populate abiotic characteristics.

Type locality

Location 1: Lincoln County, NV	
Township/Range/Section	T6S R67E S2
General legal description	NE¼ Section 2, T6S. R67E. MDBM. About 1 mile east of Mt. Ella tower on Pennsylvania Canyon Road, Clover Mountains, Lincoln County, Nevada. This site also occurs in Clark County Nevada.

Other references

Fire Information Effects System. http://www.fs.fed.us/database/feis/

Johnson, D.W., Susfalk, R.B., Dahlgren, R.A. and Klopatek, J.M., 1998. Fire is more important than water for nitrogen fluxes in semi-arid forests. Environmental Science & Policy, 1(2), pp.79-86.

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Spurr, S.H. and Barnes, B.V., 1973. Forest ecology.

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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	02/24/2025
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):**

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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:**
