Ecological site F030XC293NV
QUARTZITE SLOPES

Last updated: 4/26/2024
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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 side slopes and back slopes. Slopes range from 15 to 75 percent, but are typically 30 to 75 percent. Elevations are 7300 to 9000 feet. Soils associated with this forest site are shallow and well drained. They formed in residuum weathered from quartzite and/or colluvium derived from quartzite. The soils of this site are skeletal with 20 to 50 percent rock fragments by volume.

This site is part of group concept R030XC287NV.

Associated sites

F030XC292NV	**LIMESTONE SLOPES** PIPOS/ARNO4/POFE

Similar sites

F030XC292NV	**LIMESTONE SLOPES** PIPOS/ARNO4/POFE [ARNO4 dominant shrub]
F030XC295NV	**MOUNTAIN INSET FANS** PIPOS/AMUT/POFE [AMUT dominant shrub]

Table 1. Dominant plant species

Tree	(1) *Pinus ponderosa ssp. scopulorum*
Shrub	(1) *Artemisia tridentata ssp. vaseyana*
Herbaceous	(1) *Poa fendleriana*

Physiographic features

This forest site occurs on mountain side slopes and back slopes. Slopes range from 15 to 75 percent, but are typically 30 to 75 percent. Elevations are 7300 to 9000 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountain slope
Elevation	7,300–9,000 ft
Slope	15–75%

Climatic features

The climate is semi-arid with warm, dry summers and cold, moist winters. Precipitation is greatest in the winter with a lesser secondary peak in the summer, typical of the Mojave Desert. Average annual precipitation is between 13 and 15 inches. Mean annual air temperature is 43 to 50 degrees F. The average growing season is 50 to 150 days.

Table 3. Representative climatic features

Frost-free period (average)	150 days
Freeze-free period (average)	
Precipitation total (average)	15 in

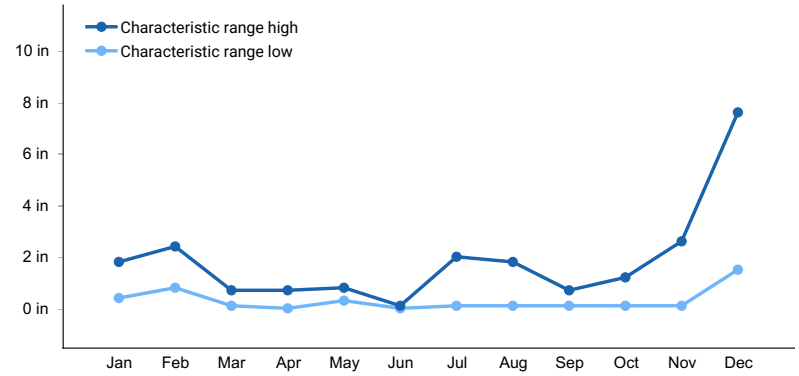


Figure 1. Monthly precipitation range

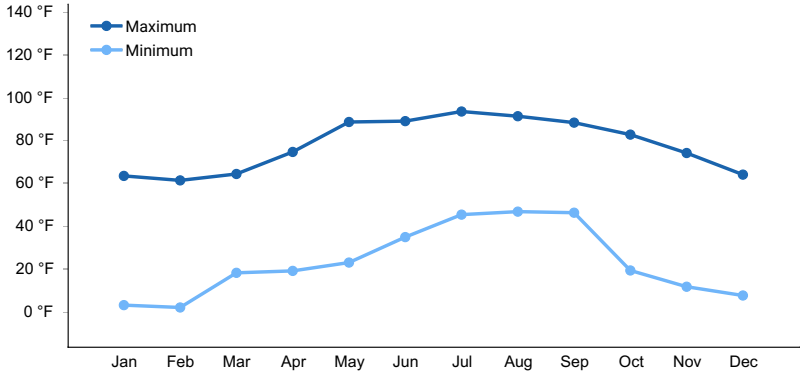


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

There are no influencing water features associated with this ecological site.

Soil features

Soils associated with this forest site are shallow and well drained. They formed in residuum weathered from quartzite and/or colluvium derived from quartzite. The soils of this site are skeletal with 20 to 50 percent rock fragments by volume. Runoff is very high and saturated hydraulic conductivity is moderately low above the bedrock and very low within the bedrock. Diagnostic features include a mollic epipedon from 0 to 10 inches, an argillic horizon from 4 to 17 inches and lithic contact at 17 inches. The official soil series correlated to this site include Hiddenforest, loamy-skeletal, mixed, superactive, mesic aridic Lithic Argiustolls.

Table 4. Representative soil features

Parent material	(1) Residuum–quartzite (2) Colluvium–quartzite
Surface texture	(1) Very gravelly loam
Family particle size	(1) Loamy

Drainage class	Well drained
Permeability class	Very slow
Soil depth	14–20 in
Surface fragment cover <=3"	55–65%
Surface fragment cover >3"	15–30%
Available water capacity (0-40in)	1.15–2.17 in
Calcium carbonate equivalent (0-40in)	0–1%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–2
Soil reaction (1:1 water) (0-40in)	7.9–8.4
Subsurface fragment volume <=3" (Depth not specified)	20–40%
Subsurface fragment volume >3" (Depth not specified)	5–10%

Ecological dynamics

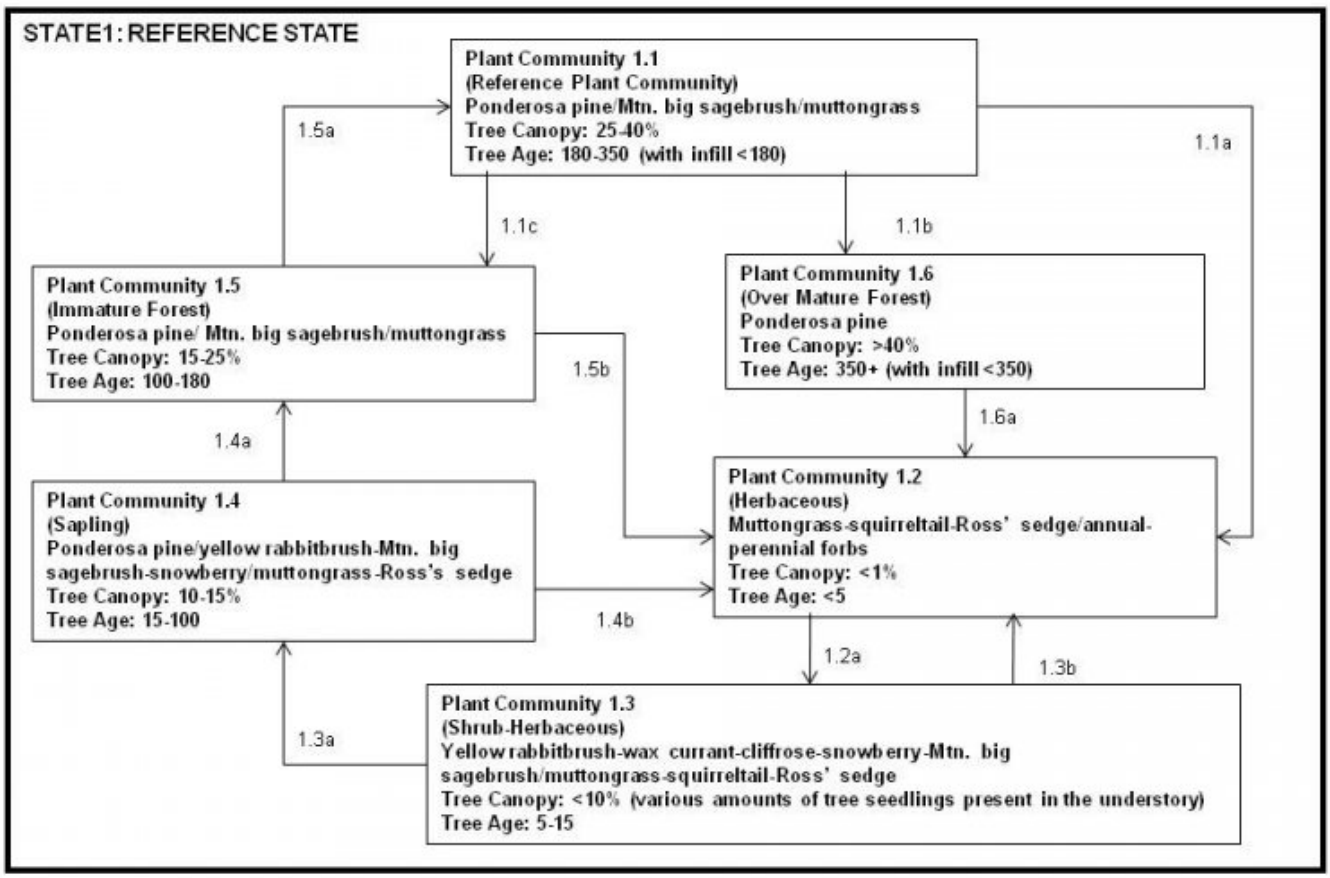
The plant communities of this site are dynamic in response to changes in disturbance regimes and weather patterns. Fire plays an important role in all forest ecosystems. Important processes that are regulated by fire include regeneration and reproduction, seedbed preparation, competition reduction and thinning to maintain stand health (Spurr and Barnes 1964). Rocky Mountain ponderosa pine is found throughout the West and grows on discontinuous mountains, plateaus, and canyons. A possible explanation for its limited and spotty distribution is correlated to the distribution of sites that receive summer rainfall (Oliver and Ryker 1992). Ponderosa pine seedlings are able to grow taproots that extend greater than 20 inches within a few months of germination (Oliver and Ryker 1992). This ability is essential for survival in desert ecosystems. Rocky Mountain ponderosa pine differs from typical ponderosa pine with its shorter needles, fewer needles per fascicle, germination rate and root growth capacity (Krugman and Jenkinson 2008). 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. The southern sources, which occur in Nevada, are slower growing but also frost resistant (Krugman and Jenkinson 2008). 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. Insulation provided the tree canopy and litter layer also reduces the temperature fluctuation from day to night (Fisher and Binkley 2002). 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 nutrients uptake (Spurr and Barnes 1964).

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. A review of the literature shows the post fire nitrogen fixation is more important than atmospheric deposition and leaching in semi-arid systems. Fire affects the nitrogen pool of a forest in two ways: 1) volatilization during the fire and 2) the influx of nitrogen fixing vegetation following the fire. Increases of nitrogen immediately after fire are attributed to the release of ammonium ($NH4+$) which takes place at temperatures above 100°C (Johnson et al. 1998). 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). The importance

of fire and post fire nitrogen fixation will continue to increase due to changes in fire frequency driven by non-native annuals and the buildup of fuels during decades of fire suppression.
Fire Ecology: Rocky Mountain ponderosa pine is considered very resistant to fire. Fire adaptations include self pruning branches, thick bark, thick bud scales, widely spaced branches that do not favor combustion and a deep rooting habit (Howard 2003). 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. Rocky Mountain juniper and white fir are intolerant of fire. Even low severity fires result in high rates of mortality. Fuel loading in stands of ponderosa pine vary depending on age class, stand structure and understory composition. The absence of naturally reoccurring wildfire has led to large accumulations of fuels in some ponderosa pine forests and an increase of shade tolerant, less fire resistant, less desirable tree species in the understory. Low severity fires generally kills trees less than 6 inches in diameter. Trees infected with dwarf-mistletoe or other diseases are more susceptible to mortality. Moderate to severe fire may remove Rocky Mountain maple, but it is easily survives low severity fire via sprouting from the root crown. In the absence of fire, white fir can become a major component of the understory, as it is extremely shade tolerant. White fir is readily killed by most fire severities and periodic fire maintains its status as a minor component of the stand. Singleleaf pinyon pine is highly susceptible to wildfire, especially when young. Following wildfire Rocky Mountain ponderosa pine, white fir, pinyon and juniper will regenerate from off-site seed.
Muttongrass is unharmed by low severity fire during the dormant season, severe fire can be harmful and is slow to recover. Ross' sedge generally survives fire through buried seed with long-term viability. Squirreltail commonly sprouts from the root crown following fire. Mountain big sagebrush is killed by fire of all severities and regeneration depends of an offsite seed source. Sagebrush recruitment is dependent on periods of favorable climate. Rabbitbrush is completely top killed by fire. It recovers well post disturbance by sprouting and from off-site seed. Rabbitbrush may increase in cover following disturbance. Desert snowberry is top killed by fire but sprouts from the root crown following fire.Threadleaf snakeweed is killed by fire, but readily establishes from seed. Stansbury cliffrose is a weak sprouter that can be killed by fire. Wax currant regeneration is favored by low-severity fire because its seeds require scarification to germinate. Spineless horsebrush is top killed but can sprout from the root crown following fire. Utah serviceberry is able to sprout from the root crown following fire, if moisture conditions are suficient.

State and transition model



F30XC293NV

Pinus ponderosa spp. scopulorum/Artemisia tridentata ssp. vaseyana/Poa fendleriana

State 1
Reference State

The reference state is representative of the natural range of variability under pristine conditions. It is dominated by Rocky Mountain ponderosa pine with traces of juniper, singleleaf pinyon pine and white fir in the canopy. Primary natural disturbance mechanisms affecting this ecological site are wildfire, disease, insect attack and periodic drought. Timing of fire combined with weather events determine the community dynamics. Increased mortality following drought is likely, caused by a combination of insect attack and disease. This ecological site is currently described by a one state model because additional states have not been identified at this time. If in the future additional stable states are identified on the landscape changes will be made to this model to reflect findings.

Community 1.1
Reference Plant Community

Figure 3. Mature

Figure 4. Mature Forest

The reference plant community is representative of the natural range of variability under pristine conditions. Tree canopy cover ranges from 25 to 40 percent and is dominated by Rocky Mountain ponderosa pine. Understory vegetation is strongly influenced by tree competition, overstory shading, duff accumulation, etc. Infrequent, yet periodic, wildfire is presumed to be a natural factor influencing the understory of mature ponderosa pine forests. Mature ponderosa pine trees are relatively resistant to cool, slow burning, wildfires through the understory due to their thick, insulating bark. This stage of community development is assumed to be representative of this forest site in the pristine environment.

Forest overstory. An overstory canopy cover of about 25 to 40 percent is assumed to be representative of tree dominance on this site in the pristine environment. Wildfire is recognized as a natural disturbance that strongly influences the structure and composition of the climax vegetation of this forest site.
Overstory tree canopy composition is 90 percent Rocky Mountain ponderosa pine (Pinus ponderosa var. scopulorm). White fir (Abies concolor) and singleleaf pinyon pine (Pinus monophylla), Utah juniper (Juniperus osteosperma), curlleaf mountain mahogany (Cercocarpos ledifolius) and Rocky Mountain juniper (Juniperus scopulorum) may occur on the site, and collectively, comprise approximately 10 percent of the total tree canopy.

Forest understory. Understory vegetative composition is about 30 percent grasses, 20 percent forbs and 50 percent shrubs and young trees when the average overstory canopy is medium (25 to 40 percent). The principle understory shrub is mountain big sagebrush. Dominant understory grass and grass-likes are muttongrasses and Ross' sedge. Average understory production ranges from 100 to 400 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. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	35	75	140
Grass/Grasslike	25	75	100
Tree	20	50	80
Forb	20	50	80
Total	**100**	**250**	**400**

Community 1.2
Herbaceous

This plant community is representative of an post-disturbance plant community phase. Vegetation is dominated by grasses and forbs under full sunlight. This stage is experienced after wildfire, disease or insect outbreak, or other major physical disturbance. Standing snags remaining after disturbance have little or no affect on the composition and production of herbaceous vegetation, but can provide important wildlife habitat. This plant community is at-risk of invasion by non-natives. Non-native species take advantage of increased available critical resources following fire or other disturbance.

Community 1.3
Shrub-Herbaceous

This community phase is dominated by herbaceous vegetation and woody shrubs. Various amounts of tree seedlings (less than 20 inches in height) may be present up to the point where they are obviously a component of the vegetal structure. Sprouting shrubs, such as snowberry and horsebrush, quickly recover and provide favorable sites for establishment of other shrub seedlings. Fast moving, low intensity fires result in the incomplete removal of sagebrush, allowing for direct reestablishment through on-site seed.

Community 1.4
Sapling

This plant community is characterized by increasing woody perennials. In the absence of disturbance, the tree seedlings develop into saplings (20 inches to 4½ feet in height) with a canopy cover generally of about 15 percent. Open canopy allows understory vegetation to be dominated by shrubs, grasses and forbs, in association with tree saplings. Sufficient time has passed for the complete recovery of sagebrush. Sagebrush and other shrubs serve as nurse plants for tree seedlings.

Community 1.5
Immature Forest

The visual aspect and vegetal structure are dominated by ponderosa pine greater than 4.5 feet in height. Young ponderosa pine is very susceptible to fire at this stage and are easily killed by all fire intensities. Seedlings and saplings of ponderosa pine are common 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 15 to 25 percent. Black sagebrush and other shrubs serve as nurse plants for ponderosa pine seedlings.

Community 1.6
Over-mature Forest

This stage is dominated by ponderosa pines that have reached maximal heights for the site. Understory vegetation is severely reduced or even absent due to tree competition, overstory shading, duff accumulation, etc. Few seedlings or saplings of ponderosa pine are found in the understory. Where white fir grows with ponderosa pine this community phase is characterized by an over abundance of suppressed white fir seedlings and saplings in the understory. This plant community experiences more runoff and less infiltration during precipitation events and is at-risk or soil loss due to surface erosion. Loss of understory vegetation reduces water storage, soil stability and inputs

of orgainic matter.

Pathway 1.1a
Community 1.1 to 1.2

Stand replacing fire, disease, prolonged drought and/or insect attack.

Pathway 1.1c
Community 1.1 to 1.5

Thinning partial harvest, partial mortality from pest, disease or other small scale disturbance.

Pathway 1.1b
Community 1.1 to 1.6

Absence from disturbance, continued growth and fire suppression.

Pathway 1.2a
Community 1.2 to 1.3

Absence from disturbance and natural regeneration over time.

Pathway 1.3b
Community 1.3 to 1.2

Wildfire, prolonged drought, disease and/or insect attack.

Pathway 1.3a
Community 1.3 to 1.4

Absence from disturbance and natural regeneration over time.

Pathway 1.4b
Community 1.4 to 1.2

Wildfire, prolonged drought, disease and/or insect attack.

Pathway 1.4a
Community 1.4 to 1.5

Absence from disturbance and natural regeneration over time.

Pathway 1.5a
Community 1.5 to 1.1

Absence from disturbance, seedling and sapling growth and natural regeneration over time.

Pathway 1.5b
Community 1.5 to 1.2

Wildfire, prolonged drought, disease and/or insect attack.

Pathway 1.6a
Community 1.6 to 1.2

Stand replacing fire, disease, insect attack and/or severe drought.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Primary Perennial Grasses/Grasslikes**			45–89	
	muttongrass	POFE	*Poa fendleriana*	38–75	–
	Ross' sedge	CARO5	*Carex rossii*	8–14	–
2	**Secondary Perennial Grasses**			4–16	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	2–8	–
	squirreltail	ELEL5	*Elymus elymoides*	2–8	–
Forb					
3	**Perennial Forbs**			20–75	
	Nuttall's linanthus	LENUP	*Leptosiphon nuttallii ssp. pubescens*	12–22	–
	firecracker penstemon	PEEA	*Penstemon eatonii*	2–8	–
	pinewoods lousewort	PESE2	*Pedicularis semibarbata*	2–8	–
	stemless mock goldenweed	STAC	*Stenotus acaulis*	2–8	–
	rosy pussytoes	ANRO2	*Antennaria rosea*	2–8	–
	Wyoming Indian paintbrush	CALI4	*Castilleja linariifolia*	2–8	–
	Clokey's fleabane	ERCL	*Erigeron clokeyi*	2–8	–
	sulphur-flower buckwheat	ERUM	*Eriogonum umbellatum*	2–8	–
Shrub/Vine					
4	**Primary Shrubs**			15–40	
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	15–36	–
5	**Secondary Shrubs**			20–70	
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	12–22	–
	threadleaf snakeweed	GUMI	*Gutierrezia microcephala*	2–8	–
	Stansbury cliffrose	PUST	*Purshia stansburiana*	2–8	–
	wax currant	RICE	*Ribes cereum*	2–8	–
	desert snowberry	SYLO	*Symphoricarpos longiflorus*	2–8	–
	mountain snowberry	SYOR2	*Symphoricarpos oreophilus*	2–8	–
	spineless horsebrush	TECA2	*Tetradymia canescens*	2–8	–
	Rocky Mountain maple	ACGLD3	*Acer glabrum var. diffusum*	2–8	–
	Utah serviceberry	AMUT	*Amelanchier utahensis*	2–8	–
	curl-leaf mountain mahogany	CELE3	*Cercocarpus ledifolius*	2–8	–
Tree					
6	**Evergreen**			6–24	
	white fir	ABCO	*Abies concolor*	2–8	–
	curl-leaf mountain mahogany	CELE3	*Cercocarpus ledifolius*	2–8	–
	Utah juniper	JUOS	*Juniperus osteosperma*	2–8	–
	Rocky Mountain juniper	JUSC2	*Juniperus scopulorum*	2–8	–
	singleleaf pinyon	PIMO	*Pinus monophylla*	2–8	–
	ponderosa pine	PIPOS	*Pinus ponderosa var. scopulorum*	2–8	–

Table 7. Community 1.1 forest overstory composition

Common Name	Symbol	Scientific Name	Nativity	Height (Ft)	Canopy Cover (%)	Diameter (In)	Basal Area (Square Ft/Acre)
Tree							
ponderosa pine	PIPO	*Pinus ponderosa*	Native	–	85–90	–	–
singleleaf pinyon	PIMO	*Pinus monophylla*	Native	–	1–3	–	–
Utah juniper	JUOS	*Juniperus osteosperma*	Native	–	1–3	–	–
white fir	ABCO	*Abies concolor*	Native	–	1–3	–	–
curl-leaf mountain mahogany	CELE3	*Cercocarpus ledifolius*	Native	–	1–3	–	–
Rocky Mountain juniper	JUSC2	*Juniperus scopulorum*	Native	–	1–3	–	–

Animal community

Livestock Interpretations: This site has limited value for livestock grazing although grazing animals may use this site during the hot summer months. Herbaceous forage production is quite low and the site is not easily accessed because due to steep slopes and lack of adequate water resources. The amount and nature of the understory vegetation in a forestland is highly dependent on the amount and duration of shade provided by the overstory canopy. Significant changes in kinds and abundances of plants occur as the canopy changes, often regardless of grazing use.

Muttongrass is a valuable forage resource. It has been rated excellent forage for domestic cattle and horses. Ross's sedge value as a forage plant varies depending on the site. It has been rated fair for domestic sheep, horses and cattle. Bottlebrush squirreltail is palatable to domestic livestock. Winter months show greatest use and it generally increases under heavy grazing pressure. Indian ricegrass accounts for a small amount of total production on this site, but is highly palatable to all classes of livestock. Dominant shrubs provide additional foraging resources on this ecological site. Mountain big sagebrush is eaten by domestic livestock, but is low in palatability and will increase under heavy grazing pressure. Snowberry provides important forage for elk and deer on high elevation summer ranges. Snowberry is one of the first species to leaf out and therefore it is heavily used in the spring. Snowberry is capable of sprouting and therefore can persist and even increase under moderate browsing pressure. Prolonged browsing can result in reduced densities. Wax currant provides poor to fair browse for domestic livestock, although it can be of great importance when little else is available. Stansbury cliffrose provides important winter browse for domestic livestock. Livestock will eat rabbitbrush in the late fall and winter when more desirable types of forage have been depleted.

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.

Wildlife Interpretations: This area is valuable habitat for a variety of birds including, owls, goatsuckers, swifts, hummingbirds, wood peckers, flycatchers, nuthatches, thrushes and finches. It also has moderate forage value for big game during the summer, fall, and early winter, especially in areas with wax currant other browse species in the understory. This site is also used by various other song birds, rodents and associated predators natural to the area. Many upland wildlife species find valuable foraging and habitat resources on this ecological site. Several wildlife species utilized bottlebrush squirreltail. It provides important forage for ground squirrels, cottontails and black-tailed jackrabbits and less important forage for mule deer. Muttongrass provides good forage for deer. The seeds and leaves are also used by a variety of birds. Ross's sedge provides occasional forage for mule deer. Indian ricegrass is preferred by jackrabbits and many species of birds. It is moderately utilized by many other species of wildlife. Dominant shrubs provide additional foraging resources. Mountain big sagebrush provides important winter browse for mule deer. Mountain snowberry provides important forage for deer on high elevation summer ranges. Snowberry is one of the first species to leaf out and therefore it is heavily used in the spring. Snowberry is capable of sprouting and therefore can persist and even increase under moderate browsing pressure. Prolonged browsing can result in reduced densities. Wax currant provides food and cover for wildlife. It is only fair to poor browse for deer, but is important on ranges were little else is available. Stansbury cliffrose is important browse species for mule deer,

game birds and songbirds Rabbitbrush is an important source of browse for wildlife species. It is used by mule deer, jack rabbits, other small mammals, and upland birds. Rocky Mountain juniper provides fair winter forage, excellent escape cover and good fawning cover. White fir provides spring forage for mule deer and good cover for many other wildlife species.

Hydrological functions

The soils correlated to this ecological site are characterized by very high runoff and very slow permeability. The potential for sheet and rill erosion can be very high, depending on the degree of slope and amount of surface rock fragments.

Recreational uses

This site has high aesthetic value and provides a variety of recreational opportunities such as hiking, camping and permitted hunting, as well as, nature study and bird watching. Steep slopes and the fragile soil-vegetation complex, however, inhibit many other forms of recreation such as the use of off-road vehicles.

Wood products

This forest community is of poor site quality for tree production. Site Index ranges from 42 to 52 (Meyer 1961).

Fuelwood Production: 30 to 43 cords per acre for stands averaging 35 to 50 feet in height and 200 years of age with a medium canopy cover (USDA 1935). 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.

LIMITATIONS AND CONSIDERATIONS
a. Potential for sheet and rill erosion is
slight to moderate depending on slope.
b. Severe equipment limitations due to steep
slopes.

2. ESSENTIAL REQUIREMENTS
a. Protect soils from accelerated erosion.
b. Manage for protection of wildlife habitat.
c. Adequately protect from wildfires.

3. SILVICULTURAL PRACTICES
a. Traditional silvicultural treatments, such as harvest cutting, are not reasonably applied on this site due to poor site quality and severe limitations for equipment and tree harvest.
This site has potential for using hand-crews for thinning and improvement cuttings to remove diseased and overcrowded trees. Improvement cuttings cut selectively or in small patches (dependent upon site conditions) to enhance forage production, wildlife habitat and forest health.
1) Thinning and improvement cutting - Removal of poorly formed, diseased and low vigor trees for fuelwood.
2) Slash Disposal - broadcasting slash improves reestablishment of native understory herbaceous species and establishment of seeded grasses and forbs after tree harvest.
b. Wildfire hazard – Low wildfire hazard in well-managed, mature stands.

Other products

Tribes native to the region used big sagebrush leaves and branches for medicinal teas and as a fumigant. The bark was used to weave mats, bags and clothing. The fruit of wax currant is used for making jam, jelly and pie. Indian tribes native to western America used currants for making pemmican and it is currently grown as an ornamental.Indian ricegrass was an important food staple for many Indian tribes.

Table 8. 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	*PIPO*	40	55	21	39	100	–	–	

Type locality

Location 1: Clark County, NV	
Township/Range/Section	T15S R60E S35
UTM zone	N
UTM northing	4050498
UTM easting	658899
Latitude	36° 36′ 12″
Longitude	115° 13′ 25″
General legal description	Sheep Peak USGS 7.5 minute topographic quadrangle. Approximately 1.5 mi from Sheep Peak in the Sheep Range found in the Desert National Wildlife Refuge. North-east of Highway 95 and west of Highway 93 Clark County, Nevada.

Other references

Fisher, R. and D. Binkley. 2002. Ecology and Management of Forest Soils. John Wiley & Sons, New York, NY.
Howard, J. L. 2003. Pinus ponderosa var. scopulorum. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer) Available:http://www.fs.fed.us/database/feis/
Johnson, D.W., R.B. Susfalk, R.A. Dahlgren and J.M. Klopatek. 1998. Fire is more important than water for nitrogen fluxes in semi-arid forests. Environmental Science and Policy. 1:79-86.
Krugman, S.L. and J.L. Jenkinson. 2008. Pinus L. Woody Plant Seed Manual. USDA FS Agriculture Handbook 727. P819.
Lanner, R.M. 1984. Trees of the Great Basin. University of Nevada Press, Reno NV.
Meyer, W.H. 1961. Yield of even-aged stands of ponderosa pine. USDA Tech Bull 630. (revised 1961).
Oliver, W.W. and R.A. Ryker. 1992. “Pinus ponderosa Dougl. ex Laws.” FS INFO-Intermoutain Monthly Alert. April 1992. No 131:413-423.
Spurr, S.H. and B.V. Barnes. 1964. Forest Ecology. John Wiley and Sons. New York, N.Y.
USDA. 1935. Instructions for the scaling and measurement of National Forest Timber Misc. Pub. 225.
USDA-NRCS. 2004. National Forestry Handbook.

Contributors

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Approval

Kendra Moseley, 4/26/2024

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	05/08/2024
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:

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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:**
