USDA Natural Resources
Conservation Service

Ecological site F027XY081NV
Shallow Rocky Loam

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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.

MLRA notes

Major Land Resource Area (MLRA): 027X–Fallon-Lovelock Area

Physiography
Found in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus this area is characterized by isolated uplifted fault block mountain ranges trending north to south that are separated by broad, hydrologically closed basins. The entire area occurs in the rain-shadow of the Sierra Nevada mountains and is influenced by Pleistocene Lake Lahontan which reached its most recent high stand about 12,000 years ago. There is substantial evidence suggesting the western Great Basin has been the site of pluvial-interpluvial cycles for at least the past two million years.
The mountains and valleys are dissected by the Humboldt, Truckee, Carson, and Walker Rivers and their tributaries, all of which terminate within MLRA 27. Extensive playas can be found throughout this area and are the result of drying of ancient Lake Lahontan. Elevation generally ranges from 3,300 to 5,900 feet (1,005 to 1,800 meters) in valleys, but on some mountain peaks it is more than 7,870 feet (2,400 meters).

Geology
Landforms and soils of this MLRA have been heavily influenced by fluctuating lake level over the last 40,000 years. There is a level line evident on the higher slopes marking the former extent of glacial Lake Lahontan. Almost half of this area has surface deposits of alluvial valley fill influenced by lacustrine sediment. The rest has andesite and basalt rocks of different ages. Mesozoic and Tertiary intrusives are concentrated along the western border of the area, and Lower Volcanic Rocks (17 to 43 million years old) are common on the eastern side of the area. Also, some scattered outcrops of Mesozoic sedimentary and volcanic rocks and tuffaceous sedimentary rocks are in the mountains within the interior of this MLRA.

Climate
The average annual precipitation is 5 to 10 inches (125 to 255 millimeters) in most of the area but is as much as 19 inches (485 millimeters) on high mountain slopes. Most of the rainfall occurs as high-intensity, convective thunderstorms during the growing season. The amount of precipitation is very low from summer to mid-autumn. The precipitation in winter occurs mainly as snow. The average annual temperature is 43 to 54 degrees F (6 to 12 degrees C). The freeze-free period averages 155 days and ranges from 110 to 195 days, decreasing in length with elevation.

Water
The amount of precipitation is very low, and water for irrigation is obtained principally from diversions on the four large rivers in the area and from water stored in the Lahontan, Rye Patch, and Weber Reservoirs. Pyramid Lake and Walker Lakes are terminal lakes for the Truckee and Walker Rivers, respectively. Much of the annual flow of both rivers is diverted for irrigation, causing lake levels to fall and levels of dissolved salts to increase causing problems for the native Lahontan cutthroat trout.

Soils
The dominant soil orders are Aridisols and Entisols. The soils in the area are predominantly mesic temperature regime, and aridic moisture regime, and have a mixed mineralogy. They are generally well drained, loamy or sandy, commonly skeletal, and shallow to very deep. Accumulation of salts, tufa deposits, and eolian sediments with soluble salts over lacustrine deposits influence most of the soils in the basin landforms of this MLRA. Soils on bedrock-controlled landforms are typically comprised of volcanic or tuffaceous sedimentary colluvium over residuum.

Biological Resources
This area supports extensive areas of salt-desert shrub vegetation. Shadscale and Bailey’s greasewood are widespread, occurring both individually and together. Grasses are generally sparse, although Indian ricegrass is prominent, especially on the sandy soils. Fourwing saltbush, winterfat, spiny hopsage, wolfberry, ephedra, dalea, and bud sagebrush are common shrubs. Basin wildrye, creeping wildrye, alkali sacaton, saltgrass, black greasewood, rubber rabbitbrush, and big saltbush are important plants on saline bottom lands and terraces. A few marsh areas support cattail, bulrushes, sedges, and rushes. Big sagebrush, along with scattered Utah juniper and singleleaf pinyon, is associated with Thurber needlegrass, desert needlegrass, Sandberg bluegrass, and squirreltail on the higher elevation piedmont slopes and mountains.

LRU notes

Topography/geomorphology: The Mountain LRU is characterized by the highest elevations of D27. It includes the Stillwater, Clan Alpine and Humboldt mountain ranges. Aspect is an important driving factor in this LRU. Vegetation patterns and resulting soil patterns on the landscape are heavily influenced by north-south aspects. The area is dominated by

bedrock-controlled landforms. Slopes are greater than 15 percent, with a median value of 35 percent. Elevations are greater than 1800 meters (5900 feet).

Soils: Soils formed in residuum and colluvium derived from volcanic, granitic or mixed parent material. Soil temperature ranges from mesic to cryic but is dominantly frigid. Soil moisture regimes are aridic bordering on xeric or xeric.

Climate: The Mountain LRU is cooler and has slightly more effective precipitation than the rest of D27. Mean annual air temperature is less than 9.83°F. Mean annual precipitation ranges from 250 to 410 millimeters. Frost free days are less than 150 annually.

Biological characteristics: Characteristic vegetation includes low sagebrush (Artemisia arbusula spp. arbuscula), mountain big sagebrush (Artemisia tridentata spp. vaseyana), Utah juniper (Juniperus osteosperma), singleleaf pinyon (Pinus monophylla), Idaho fescue (Festuca idahoensis) and bluebunch wheatgrass* (Pseudoroegeria spicata).

*Bluebunch wheatgrass is not a component of ESCs from D27. It is not uncommon for ES from D23 or D24 to be used where bluebunch is found (or soils are considered to have to potential to support bluebunch). Future work should investigate this further, possibly resulting in revising MLRA lines.

Ecological site concept

The Shallow Rocky Loam occurs on the backslopes of mountains and hillsides and is linear or slightly concave. Soils are formed in residuum/colluvium derived from volcanic or mixed parent material. The soil is characterized by an mollic epipedon (darker colors in the upper horizons). Soil is less than 50 centimeters (20 inches) deep. This site was previously named Pinus monophylla-Juniperus osteosperma/Artemisia tridentata ssp. wyomingensis/Achnatherum thurberianum.

Associated sites

R027XY008NV	**DROUGHTY LOAM 8-10 P.Z.** Found on convex slopes.

Similar sites

R023XY039NV	**LOAMY SLOPE 10-14 P.Z.** Similar soil characteristics.

Table 1. Dominant plant species

Tree	(1) *Pinus monophylla* (2) *Juniperus osteosperma*
Shrub	(1) *Artemisia tridentata ssp. wyomingensis*

Herbaceous	(1) *Achnatherum thurberianum*

Physiographic features

The Shallow Rocky Loam woodland site occurs on mountains and hills on all aspects. Slope gradients of 15 to 75 percent are typical. Elevations are 5000 to 7500 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountain (2) Hill
Runoff class	High to very high
Flooding frequency	None
Ponding frequency	None
Elevation	5,000–7,500 ft
Slope	15–75%
Water table depth	72 in
Aspect	Aspect is not a significant factor

Climatic features

The climate is semiarid with cool, moist winters and warm, dry summers. Average annual precipitation is 10 to 14 inches. Mean annual air temperature is 43 to 47 degrees F. The average frost-free period is 70 to 115 days. There is no climate station available for this site.

Table 3. Representative climatic features

Frost-free period (average)	115 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

Associated soils are very shallow to shallow from volcanic sources. Soils are typically

skeletal with 35 to over 75 percent gravels, cobbles or stones, by volume, distributed throughout the profile. Available water capacity is very low, but trees and shrubs extend their roots into fractures in the bedrock allowing them to utilize deep moisture. Runoff is high to very high and potential for sheet and rill erosion is moderate to severe depending on slope. The soil series associated with this site include: Duco (NV768: 321, 2792; NV770: 308, 309, 320, 370, 371, 373, 660, 735, 790, 930), Jacratz (NV770: 790, 903), and Minneha (NV770: 102).

Table 4. Representative soil features

Parent material	(1) Colluvium–volcanic rock (2) Residuum–volcanic rock
Surface texture	(1) Stony loam (2) Very gravelly clay loam (3) Gravelly loam (4) Very stony loam
Family particle size	(1) Clayey
Drainage class	Well drained to somewhat excessively drained
Permeability class	Moderately slow to moderate
Depth to restrictive layer	4–20 in
Soil depth	4–20 in
Surface fragment cover <=3"	22–43%
Surface fragment cover >3"	2–10%
Available water capacity (0-40in)	1–1.7 in
Calcium carbonate equivalent (0-40in)	0–5%
Electrical conductivity (0-40in)	0 mmhos/cm
Sodium adsorption ratio (0-40in)	0
Soil reaction (1:1 water) (0-40in)	6.1–9
Subsurface fragment volume <=3" (Depth not specified)	22–43%
Subsurface fragment volume >3" (Depth not specified)	4–29%

Ecological dynamics

Major Successional Stages of Woodland Development:

HERBACEOUS: Vegetation is dominated by grasses and forbs under full sunlight. This stage is experienced after a major disturbance such as crown fire. Skeleton forest (dead trees) remaining after fire or residual trees left following harvest have little or no affect on the composition and production of the herbaceous vegetation.

SHRUB-HERBACEOUS: Herbaceous vegetation and woody shrubs dominate the site. Various amounts of tree seedlings (less than 20 inches in height) may be present up to the point where they are obviously a major component of the vegetal structure.

SAPLING: In the absence of disturbance the tree seedlings develop into saplings (20 inches to 4½ feet in height) with a range in canopy cover of about 5 to 10 percent. Vegetation consists of grasses, forbs and shrubs in association with tree saplings.

IMMATURE FORESTLAND: The visual aspect and vegetal structure are dominated by Utah juniper trees greater than 4½ feet in height. The upper crown of dominant and co-dominant trees are cone or pyramidal shaped. Seedlings and saplings of pinyon and Utah juniper are present in the understory. Dominants are the tallest trees on the site; co-dominants are 65 to 85 percent of the highest of dominant trees. Understory vegetation is moderately influenced by a tree overstory canopy of about 10 to 20 percent.

MATURE FORESTLAND: 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 height. Upper crowns of singleleaf pinyon and Utah juniper are typically either irregularly or smoothly flat-topped or rounded. Tree canopy cover ranges from 20 to 35 percent. Understory vegetation is strongly influenced by tree competition, overstory shading, duff accumulation, etc. Few tree seedlings and/or saplings occur in the understory. Infrequent, yet periodic, wildfire is presumed to be a natural factor influencing the understory of mature pinyon-juniper forest. This stage of community development is assumed to be representative of this forest site in the pristine environment.

OVER-MATURE FORESTLAND: 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 and Utah juniper that have reached maximal heights for the site. Dominant and co-dominant trees average greater than five inches in diameter at one-foot stump height. Upper crowns are typically irregularly flat-topped or rounded. Understory vegetation is sparse or absent due to tree competition, overstory shading, duff accumulation, etc. Tree canopy cover is commonly greater than 50 percent.

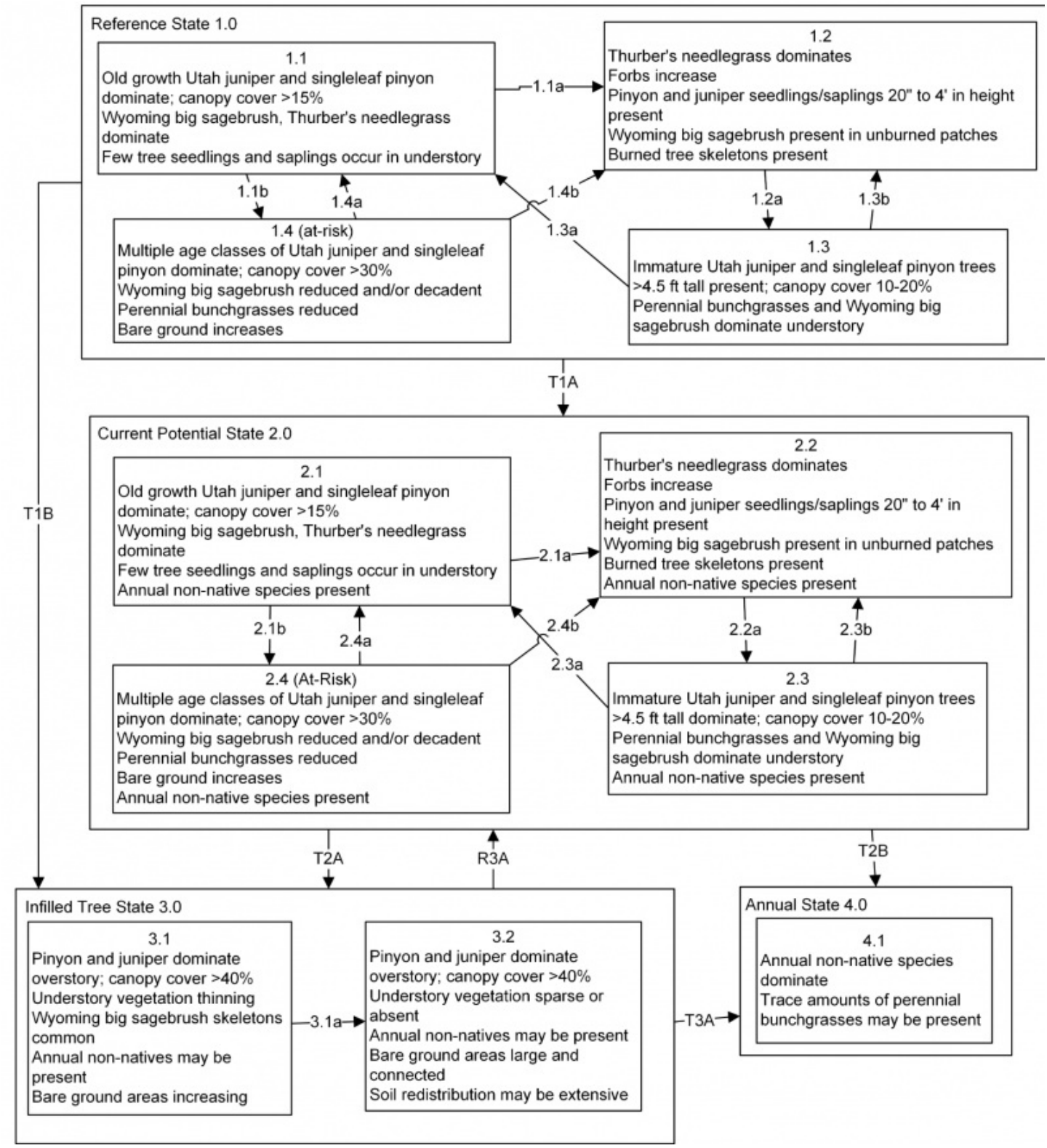
The pinyon-juniper woodland is generally a climax vegetation type throughout its range, reaching climax about 300 years after disturbance, with an ongoing trend toward increased tree density and canopy cover and a decline in understory species over time. Singleleaf pinyon seedling establishment is episodic. Population age structure is affected by drought, which reduces seedling and sapling recruitment more than other age classes.

The ecotones between singleleaf pinyon woodlands 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 woodlands 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.
Utah juniper is not shade tolerant. It is a climax species in harsh areas where stands are open and regeneration can occur without competition for light.
Across the West, junipers have expanded their historical range in the years since European settlement, Utah juniper is used by many birds and animals, both wildlife and livestock, for cover and food. especially into sagebrush-grass communities below areas of traditional pinyon-juniper. Overgrazing, fire suppression, and climatic change have been identified as potential causes of juniper invasion. In the absence of fire or other disturbances, trees eventually dominate the site and crowd out herbaceous and shrub species.
Juniper litter has an allelopathic effect on some understory species, especially Sandberg bluegrass, and blue grama. This effect is particularly evident on heavy, poorly drained clay soils. Broadcasting grass seeds over litter appeared to lower the allelopathic effects.

Fire Ecology:
The fire return intervals for Utah juniper communities range from 10 to 30 years. Utah juniper is usually killed by fire, especially when trees are small. Thin bark and lack of self pruning make singleleaf pinyon very susceptible to intense fire. Mature singleleaf pinyon can survive low-severity surface fires but is killed by more severe fires. Most tree seedlings are killed by fire, but cached seeds may survive.
Wyoming big sagebrush is killed by fire and establishes after fire from a seedbank; from seed produced by remnant plants that escaped fire; and from plants adjacent to the burn that seed in.
Mountain big sagebrush is highly susceptible to injury from fire. It is often top-killed by fire and will not resprout.
Thurber’s needlegrass is classified as moderately resistant, but depending on season of burn, phenology, and fire severity, this perennial bunchgrass is moderately to severely damaged by fire. Early season burning is more damaging to this needlegrass than late season burning.
Muttongrass is unharmed to slightly harmed by light-severity fall fires. Muttongrass appears to be harmed by and slow to recover from severe fire.

Sandberg bluegrass is generally unharmed by fire. It produces little litter, and its small bunch size and sparse litter reduces the amount of heat transferred to perennating buds in the soil. Its rapid maturation in the spring also reduces fire damage, since it is dormant when most fires occur.

State and transition model



Reference State 1.0 Community Pathways
1.1a: High severity crown fire reduces or eliminates tree cover.
1.1b: Time and lack of disturbance such as fire, disease, or drought allows younger trees to infill.
1.2a: Time and lack of disturbance such as fire or drought. Excessive herbivory may also reduce perennial grass understory.
1.3a: Time and lack of disturbance such as fire or drought. Excessive herbivory may also reduce perennial grass understory.
1.3b: Fire.
1.4a: Low severity fire, insect infestation, or disease removes individual trees and reduces total tree cover.
1.4b: High severity crown fire reduces or eliminates tree cover.

Transition T1A: Introduction of non-native annual species.
Transition T1B: Time and a lack of disturbance allows for trees to dominate site resources; may be coupled with inappropriate grazing management that favors shrub and tree dominance.

Current Potential State 1.0 Community Pathways
2.1a: High severity crown fire reduces or eliminates tree cover.
2.1b: Time and lack of disturbance such as fire, disease, or drought allows younger trees to infill.
2.2a: Time and lack of disturbance such as fire or drought. Excessive herbivory may also reduce perennial grass understory.
2.3a: Time and lack of disturbance such as fire or drought. Excessive herbivory may also reduce perennial grass understory.
2.3b: Fire.
2.4a: Low severity fire, insect infestation, or disease removes individual trees and reduces total tree cover.
2.4b: High severity crown fire reduces or eliminates tree cover.

Transition T2A: Time and a lack of disturbance allows for trees to dominate site resources; may be coupled with inappropriate grazing management that favors shrub and tree dominance.
Transition T2B: Catastrophic fire.

Infilled Tree State 3.0 Community Pathways
3.1a: Time and lack of disturbance such as fire, disease, or drought allows younger trees to infill.

Transition T3A: Catastrophic fire.

Restoration Pathway R3A: Thinning of trees coupled with seeding. Success unlikely from phase 3.2.

Annual State 4.0 Community Pathways
None.

State 1
Reference State

The Reference State is representative of the natural range of variability under pristine conditions. The Reference State has four general community phases: an old-growth tree phase, a shrub-herbaceous phase, an immature tree phase, and an infilled tree phase. State dynamics are maintained by interactions between climatic patterns and disturbance regimes. Negative feedbacks enhance ecosystem resilience and contribute to the stability of the state. These include the presence of all structural and functional groups, low fine fuel loads, and retention of organic matter and nutrients. Plant community phase changes are primarily driven by fire, periodic drought, and/or insect or disease attack. Fires within this community are infrequent and likely small and patchy due to low fuel loads. This fire type will create a plant community mosaic that will include all/most of the following community phases within this state

Community 1.1
Old Growth Juniper/Pinyon Pine

Plant Community 1.1 is dominated by Utah juniper and singleleaf pinyon. Wyoming big sagebrush is the principal understory shrub although mountain big sagebrush commonly occurs at higher elevations. Thurber needlegrass, basin wildrye, and bluegrass are the

most prevalent understory grasses. An overstory canopy cover of about 30 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 influenced the structure and composition of the climax vegetation of this woodland site. Overstory tree canopy composition is about 50 to 70 percent Utah juniper and 30 to 50 percent singleleaf pinyon.

Forest overstory. MATURE FORESTLAND: 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 height. Upper crowns of singleleaf pinyon and Utah juniper are typically either irregularly or smoothly flat-topped or rounded. Tree canopy cover ranges from 20 to 35 percent. Understory vegetation is strongly influenced by tree competition, overstory shading, duff accumulation, etc. Few tree seedlings and/or saplings occur in the understory. Infrequent, yet periodic, wildfire is presumed to be a natural factor influencing the understory of mature pinyon-juniper foresy. This stage of community development is assumed to be representative of this forest site in the pristine environment.

Forest understory. Understory vegetative composition is about 50 percent grasses, 10 percent forbs and 40 percent shrubs and young trees when the average overstory canopy is medium (20 to 35 percent). Average understory production ranges from 200 to 500 pounds per acre with a medium canopy cover. Understory production includes the total annual production of all species within 4½ feet of the ground surface.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	80	120	200
Shrub/Vine	80	120	200
Forb	20	30	50
Tree	20	30	50
Total	**200**	**300**	**500**

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**			60–126	
	Thurber's needlegrass	ACTH7	*Achnatherum thurberianum*	30–72	–
	muttongrass	POFE	*Poa fendleriana*	15–27	–
	Sandberg bluegrass	POSE	*Poa secunda*	15–27	–
2	**Secondary Perennial Grasses**			6–30	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	3–15	–
	squirreltail	ELEL5	*Elymus elymoides*	3–15	–
Forb					
3	**Perennial Forbs**			21–57	
	buckwheat	ERIOG	*Eriogonum*	15–27	–
	phlox	PHLOX	*Phlox*	3–15	–
	aster	ASTER	*Aster*	3–15	–
Shrub/Vine					
4	**Primary Shrubs**			90–177	
	Wyoming big sagebrush	ARTRW8	*Artemisia tridentata ssp. wyomingensis*	75–150	–
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	15–27	–
5	**Secondary Shrubs**			3–15	
	mormon tea	EPVI	*Ephedra viridis*	3–15	–
Tree					
6	**Evergreen**			18–42	
	singleleaf pinyon	PIMO	*Pinus monophylla*	15–27	–
	Utah juniper	JUOS	*Juniperus osteosperma*	3–15	–

Animal community

Livestock Interpretations:
This site is suited to cattle and sheep grazing during the spring, summer and fall. Grazing management should be keyed to Thurber's needlegrass production.
Thurber’s needlegrass species begin growth early in the year and remain green throughout a relatively long growing season. This pattern of development enables animals to use Thurber’s needlegrass when many other grasses are unavailable. Cattle prefer

Thurber’s needlegrass in early spring before fruits have developed as it becomes less palatable when mature. Thurber’s needlegrasses are grazed in the fall only if the fruits are softened by rain.
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.
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.
Many areas are not used because of lack of adequate water.
Livestock browse Wyoming big sagebrush, but may use it only lightly when palatable herbaceous species are available.
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.
Attentive grazing management is required due to steep slopes and associated erosion hazards. Livestock will often concentrate on this site taking advantage of the shade and shelter offered by the tree overstory.
Initial stocking rate
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.
Forage Value Rating
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.
The amount and nature of the understory vegetation in a forestland is highly responsive to the amount and duration of shade provided by the overstory canopy. Significant changes in kinds and abundance of plants occur as the canopy changes, often regardless of grazing use.

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 chukar habitat and are visited seasonally by mourning dove. It is also used by various song birds, rodents, reptiles and associated predators natural to the area.
Wyoming big sagebrush is preferred browse for wild ungulates. Pronghorn usually browse Wyoming big sagebrush heavily.
Mountain big sagebrush is highly preferred and nutritious winter forage for mule deer.

Hydrological functions

Runoff is high to very high. Permeability is moderately slow to 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

FORESTLAND CHARACTERISTICS
PRODUCTIVE CAPACITY
This forestland community is of low site quality for tree production.
Site index ranges from 35 to 50 (Howell, 1940).
Productivity Class: 0.2 to .3
CMAI*: 2.7 to 4.6 ft3/ac/yr;
0.20 to 0.30 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: 2 to 6 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 10 to 20 posts per acre in stands of medium canopy.

Christmas trees: About five trees per acre per year in stands of medium canopy. Ten trees per acre in stands of sapling stage.

MANAGEMENT GUIDES AND INTERPRETATIONS

1. LIMITATIONS AND CONSIDERATIONS

a. Potential for sheet and rill erosion is moderate to severe depending on slope.
b. Moderate 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. Tree harvest will open overstory canopy to increase understory herbaceous production. 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+10 to D+12 (
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.

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.
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.

Other products

Pinyon nuts: Production varies year to year, but mature woodland stage can yield 150 to 200 pounds per acre in favorable years.
Pinyon trees have provided Indians with food for centuries. Thousands of pounds of nuts are gathered each year and sold on the markets throughout the United States.
The berries of Utah juniper have been used by Indians for food.
Native Americans made tea from big sagebrush leaves. They used the tea as a tonic, an antiseptic, for treating colds, diarrhea, and sore eyes and as a rinse to ward off ticks. Big sagebrush seeds were eaten raw or made into meal.
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

Wyoming big sagebrush is used for stabilizing slopes and gullies and for restoring degraded wildlife habitat, rangelands, mine spoils and other disturbed sites. It is particularly recommended on dry upland sites where other shrubs are difficult to establish.

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	50	3	5	–	–	–	

Inventory data references

NASIS data for Duco, Jacratz, and Minneha.

Type locality

Location 1: Churchill County, NV	
Township/Range/Section	T16N R37E S14
General legal description	Along NvHwy 2 leading to Carrol Summit, lower elevations of Desatoya Mountains, Churchill County, Nevada. This site also occurs in Lyon and Pershing Counties, Nevada.

Other references

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Approval

Kendra Moseley, 6/03/2024

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	06/03/2024
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:

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:**