USDA Natural Resources
Conservation Service

Ecological site F029XY067NV
PIMO-JUOS WSG 0R0501 12 to 16

Accessed: 05/18/2024

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.

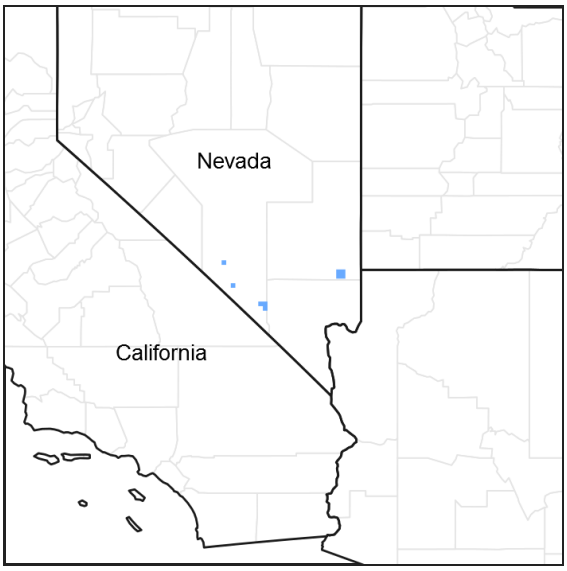


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 029X–Southern Nevada Basin and Range

MLRA 29 consists of north-south trending mountain ranges separated by broad valleys bordered by sloping fans and pediments. Majority of rocks in the mountain masses are from Pliocene and Miocene volcanic sources and include rhyolite, andesite, basalt, dacite and tuff. Paleozoic and Precambrian carbonate rocks are also prominent in the mountains. Scattered outcrops of older Tertiaty intrusives and very young tuffaceous sediments are common in the western and eastern portions of the MLRA. Pleistocene lake sediments and recent alluvium are extensive in the major valleys.
More than 90 percent of MLRA 29 is federally owned, a large portion of which is currently or has been used for training and testing by military forces and the Nuclear Regulatory Commission. Less than 1 percent of the land area, mostly in the valleys, is irrigated. Most of the irrigated land is used for growing grain or hay for livestock. Native shrub-grass rangelands are grazed by domestic livestock, feral horses and wildlife. Average annual precipitation ranges from 4 to 12 inches on the valley floors and may be as high as 36 inches in the mountains. Precipitation occurs as rain and snow during the winter and early spring. Summers are generally hot and dry, but high-intensity, convective thunderstorms are common in July and August. In the eastern portion of this MLRA these summer thunderstorms are frequent enough to influence annual production and species composition of many native plant communities.

Table 1. Dominant plant species

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

Physiographic features

This Forest community occurs on steep mountain sideslopes on all aspects. Slopes are typically 15 to 50 percent. Elevations are 5200 to about 7400 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountain
Elevation	1,585–2,256 m
Slope	15–50%
Aspect	Aspect is not a significant factor

Climatic features

Average annual precipitation is 12 to about 16 inches. Mean annual air temperature is 50 to 54 degrees F. The average frost-free period is 120 to 160 days.

Table 3. Representative climatic features

Frost-free period (average)	160 days
Freeze-free period (average)	0 days
Precipitation total (average)	406 mm

Influencing water features

There are no influencing water features associated with this site.

Soil features

Soils associated with this site are typically shallow and well drained. The soils have formed in residuum and colluvium from limestone and dolomitic limestone. Soil reaction is mildly to moderately alkaline and the soils are calcareous. These soils are skeletal with 35 to over 50 percent gravels, cobbles or stones, by volume, distributed throughout their profile. Available water capacity is low, but trees and shrubs extend their roots into fractures in the bedrock allowing them to utilize deep moisture. There are high amounts of rock fragments at the soil surface which occupy plant growing space, yet help to reduce evaporation and conserve soil moisture. Runoff is medium to rapid and potential for sheet and rill erosion is moderate to severe depending on slope. Soil temperature regime is mesic and soil moisture regime is xeric, bordering on ustic. Soil series associated with this site include: Sed and Welring.

Table 4. Representative soil features

Surface texture	(1) Very gravelly loam (2) Very cobbly loam
Drainage class	Somewhat poorly drained
Permeability class	Moderately slow to moderate
Soil depth	25–102 cm
Surface fragment cover <=3"	30–45%

Surface fragment cover >3"	4–15%
Available water capacity (0-101.6cm)	3.56–5.59 cm
Calcium carbonate equivalent (0-101.6cm)	0–30%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–2
Soil reaction (1:1 water) (0-101.6cm)	7.4–8.4
Subsurface fragment volume <=3" (Depth not specified)	20–45%
Subsurface fragment volume >3" (Depth not specified)	2–31%

Ecological dynamics

Major Successional Stages of Forestland 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 4.5 feet in height) with a range in canopy cover of about 5 to 10 percent. Vegetation consists of grasses, forbs and shrubs in association with tree saplings.

IMMATURE FOREST: The visual aspect and vegetal structure are dominated by Utah juniper and singleleaf pinyon trees greater than 4.5 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 FOREST: The visual aspect and vegetal structure are dominated by pinyon and juniper that have reached 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 a natural disturbance 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.

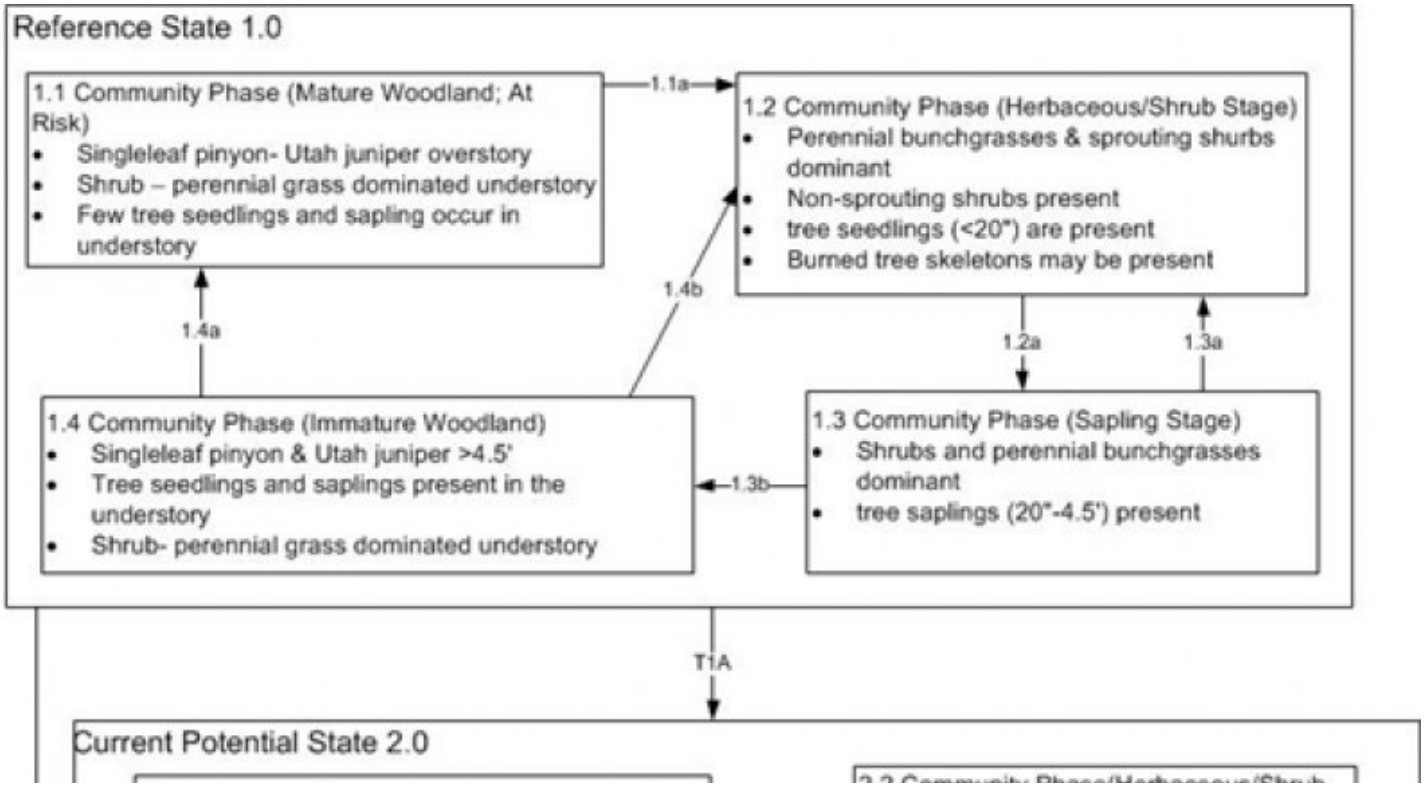
OVER-MATURE FOREST: In the absence of wildfire or other naturally occurring disturbances, the tree canopy on this site can become very dense. This stage is dominated by singleleaf pinyon and Utah juniper that have reached maximal heights for the site. Dominant and co-dominant trees average greater than 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 forestland 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 forestlands over time. These include 1) tree seedling establishment during favorable climatic periods, 2) tree mortality (especially seedlings and saplings) during periods of drought, 3) expansion of trees into adjacent grassland in response to overgrazing and/or fire suppression, and 4) removal of trees by humans, fire, or other disturbance episodes. Specific successional pathways after disturbance in singleleaf pinyon stands are dependent on a number of variables such as plant species present at the time of disturbance and their individual responses to disturbance, past management, type and size of disturbance, available seed sources in the soil or adjacent areas, and site and climatic conditions throughout the successional process.

Fire Ecology:
On high-productivity sites where sufficient fine fuels existed, pinyon-juniper communities burn every 15 to 20 years, and on less productive sites with patchy fuels, fire return intervals may be in the range of 50 to 100 years or longer. 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. The historical fire return interval for Utah juniper stands range from 20 to over 100 years. Utah juniper is usually killed by fire, especially when trees are small. Utah juniper habitat types rarely have sufficient fine fuels to produce severe or continuous fires. Aboveground parts of Utah serviceberry may be killed or consumed under fire conditions with sufficient flame lengths. Utah serviceberry may be slightly harmed by fire, depending on moisture conditions, but is generally considered to be fire tolerant. Utah serviceberry sprouts from the root crown following fire. Soil moisture is important to aid sprouting. Mountain big sagebrush is highly susceptible to injury from fire. It is often top-killed by fire and will not resprout. 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. Muttongrass is unharmed to slightly harmed by light-severity fall fires. Muttongrass appears to be harmed by and slow to recover from severe fire.

State and transition model



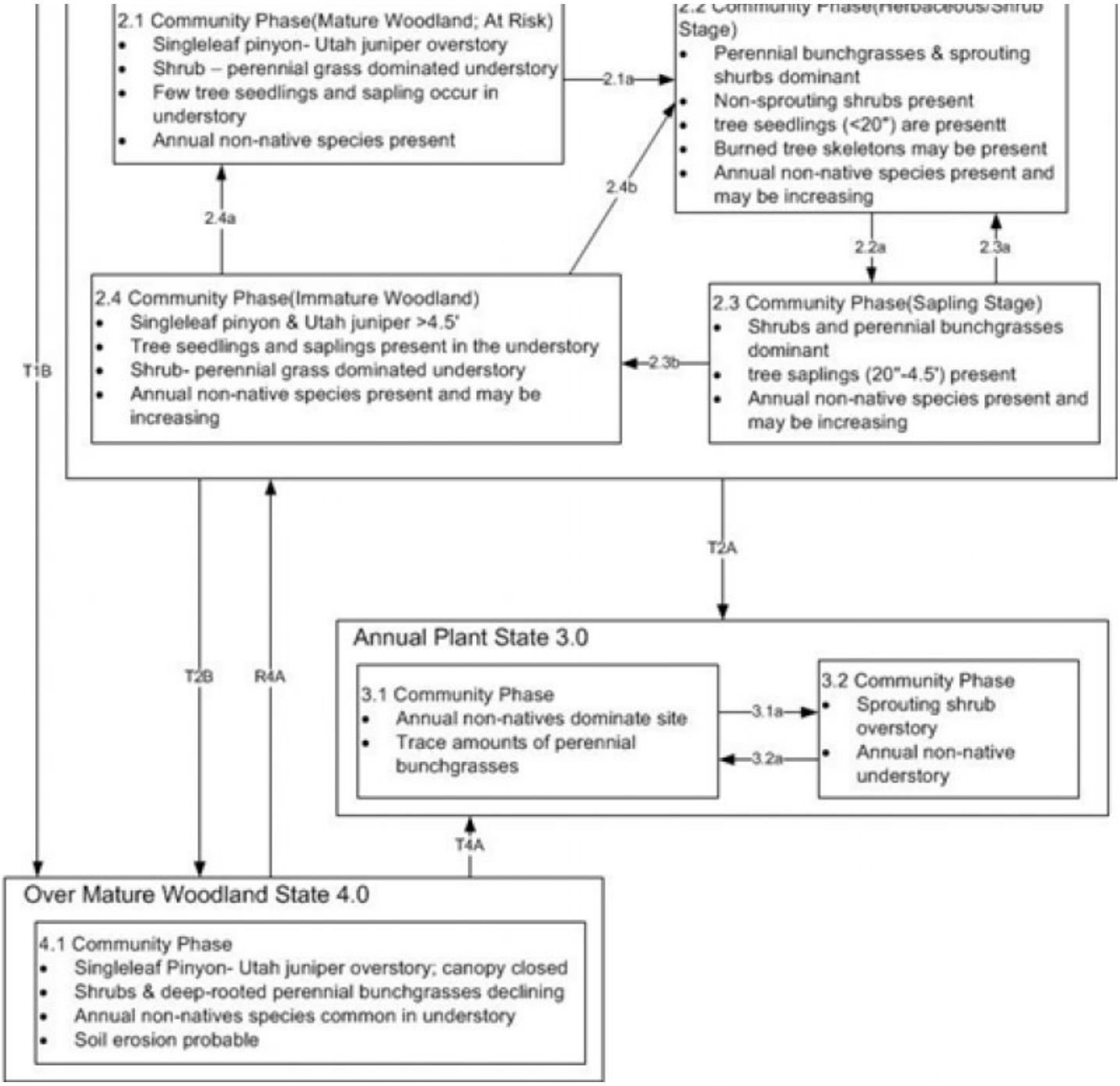


Figure 3. DRAFT STM

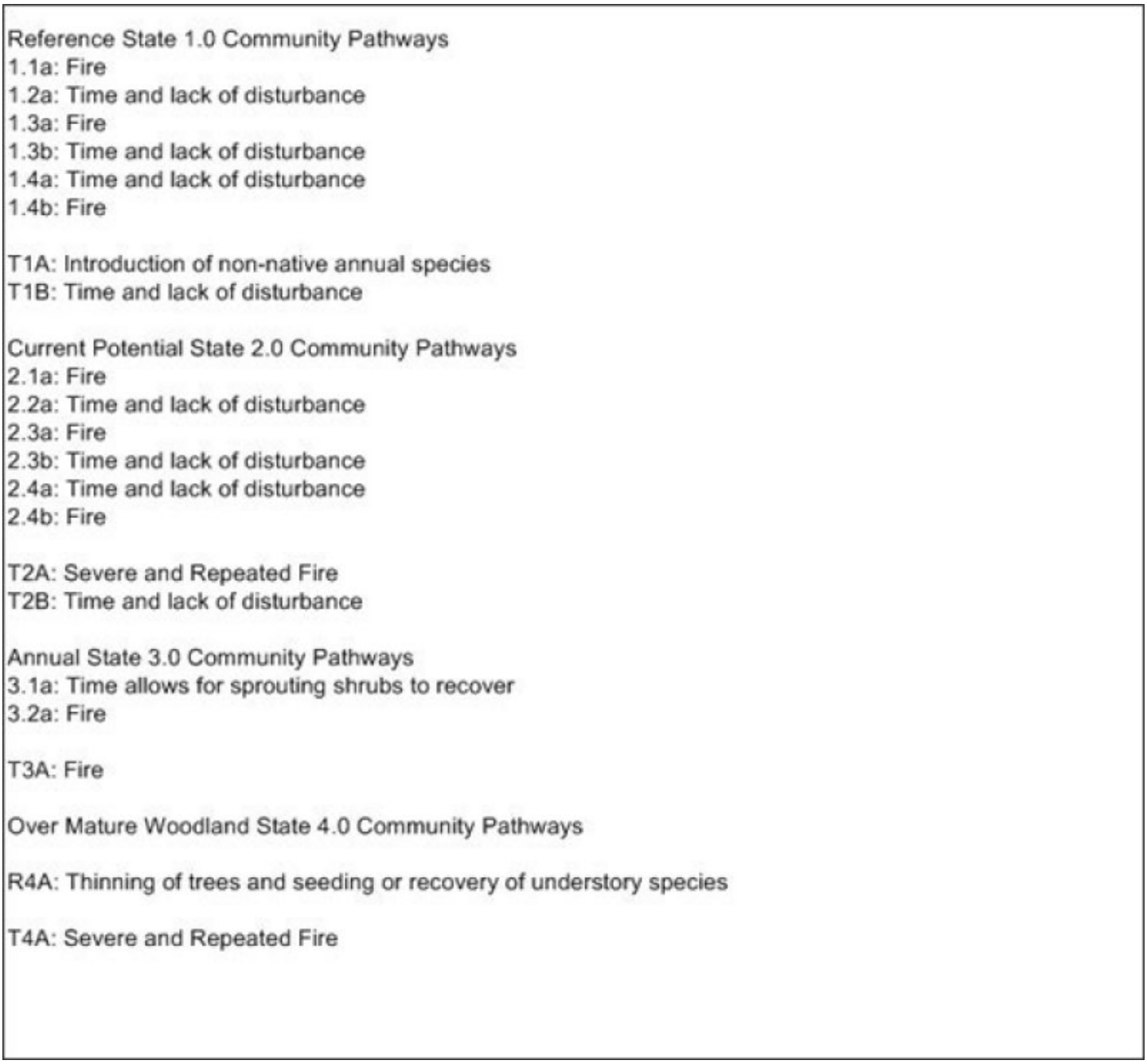


Figure 4. DRAFT STM LEGEND

State 1
Reference State

Community 1.1
Reference Plant Community

The reference plant community is dominated by singleleaf pinyon and Utah juniper. Mountain big sagebrush, Utah serviceberry, and yellowleaf silktassle are the principal understory shrubs. Muttongrass is the most prevalent understory grass. Wyoming big sagebrush occurs at the lower elevations of this site. Overstory tree canopy composition is about 20 to 40 percent Utah juniper and 60 to 80 percent singleleaf pinyon. An overstory canopy cover of 20 to 35 percent is assumed to be representative of tree dominance on this site in the pristine environment.

Forest overstory. MATURE FORESTLAND: The visual aspect and vegetal structure are dominated by pinyon and juniper that have reached 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 a natural disturbance influencing the understory of mature pinyon-juniper forestlands. This stage of community development is assumed to be representative of this forestland

site in the pristine environment.

Forest understory. Understory vegetative composition is about 20 percent grasses, 5 percent forbs and 75 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 4.5 feet of the ground surface.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	146	291	364
Grass/Grasslike	45	90	112
Tree	22	45	67
Forb	11	22	34
Total	**224**	**448**	**577**

State 2
Current Potential State

State 3
Annual State

State 4
Over Mature Woodland State

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Primary Perennial Grasses**			45–108	
	muttongrass	POFE	*Poa fendleriana*	45–108	–
2	**Secondary Perennial Grasses**			13–40	
	Sandberg bluegrass	POSE	*Poa secunda*	4–22	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	2–4	–
	desert needlegrass	ACSP12	*Achnatherum speciosum*	2–4	–
	squirreltail	ELEL5	*Elymus elymoides*	2–4	–
	needle and thread	HECO26	*Hesperostipa comata*	2–4	–
Forb					
3	**Perennial**			9–45	
	arrowleaf balsamroot	BASA3	*Balsamorhiza sagittata*	4–22	–
	tapertip hawksbeard	CRAC2	*Crepis acuminata*	4–22	–
Shrub/Vine					
4	**Primary Shrubs**			135–296	
	ashy silktassel	GAFL2	*Garrya flavescens*	45–108	–
	Utah serviceberry	AMUT	*Amelanchier utahensis*	45–108	–
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	22–40	–
	Wyoming big sagebrush	ARTRW8	*Artemisia tridentata ssp. wyomingensis*	22–40	–
5	**Secondary Shrubs**			22–112	
	mormon tea	EPVI	*Ephedra viridis*	4–22	–
	Apache plume	FAPA	*Fallugia paradoxa*	4–22	–
	pricklypear	OPUNT	*Opuntia*	4–22	–
	desert bitterbrush	PUGL2	*Purshia glandulosa*	4–22	–
	Stansbury cliffrose	PUST	*Purshia stansburiana*	4–22	–
Tree					
6	**Evergreen**			27–63	
	singleleaf pinyon	PIMO	*Pinus monophylla*	22–40	–
	Utah juniper	JUOS	*Juniperus osteosperma*	4–22	–

Animal community

Livestock Interpretations:
This site is suited to cattle and sheep grazing where terrain permits. Grazing management should be keyed to muttongrass production. Muttongrass is highly nutritious and remains palatable throughout the grazing season. Needlegrasses and Indian ricegrass provide palatable, nutritious feed during the late spring and early summer. New plants of all these grasses are established entirely from seed and grazing practices should allow for ample seed production and seedling establishment.

Many areas are not used because of steep slopes or lack of adequate water.

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 high value for mule deer during the winter. Juniper trees provide shelter from winter storms and juniper foliage is also browsed during the winter. Sites where water is available offer good quail habitat and are visited seasonally by mourning dove. It is also used by various song birds, rodents, reptiles and associated predators natural to the area.

Hydrological functions

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

Recreational uses

The trees on this site provide a welcome break in an otherwise open landscape. It has potential for hiking, cross-country skiing, camping, and deer and upland game hunting.

Wood products

This forestland community is of low site quality for tree production. Site index ranges from 35 to 55 (Howell, 1940) and about 20 to 30 (Chojnacky, 1986).

Productivity Class: 0.2 to 0.4
CMAI*: 2.7 to 5.2 ft3/ac/yr;
0.19 to 0.36 m3/ha/yr.
Culmination is estimated to be at 90 years.
*CMAI: is the culmination of mean annual increment or highest average growth rate of the stand in the units specified.

Fuelwood Production: 4 to 7 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 20 to 40 posts per acre in stands of medium canopy.
Christmas trees: 10 trees per acre per year in stands of medium canopy. Ten trees per acre in stands of sapling stage.

Pinyon nuts: Production varies year to year, but mature woodland stage can yield 250 pounds per acre in favorable years.

MANAGEMENT GUIDES AND INTERPRETATIONS

1. LIMITATIONS AND CONSIDERATIONS
a. Potential for sheet and rill erosion is moderate to severe depending on slope.
b. Moderate to severe equipment limitations on steeper slopes and moderate to severe equipment limitations on sites having extreme surface stoniness.
c. Proper spacing is the key to a well managed, multiple use and multi-product pinyon-juniper forestland.

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

3. SILVICULTURAL PRACTICES
a. Harvest cut selectively or in small patches size dependent upon site conditions) to enhance forage production.
1) Thinning and improvement cutting - Removal of poorly formed, diseased and low vigor trees for fuelwood.
2) Harvest cutting - Selectively harvest surplus trees to achieve desired spacing. Save large, healthy, full-crowned singleleaf pinyon trees for nut producers. Do not select only "high grade" trees during harvest.
3) Slash Disposal - broadcasting slash improves reestablishment of native understory herbaceous species and establishment of seeded grasses and forbs after tree harvest.
4) Spacing Guide - D+11
b. Prescription burning program to maintain desired canopy cover and manage site reproduction.
c. Mechanical tree removal (i.e. chaining) is usually not recommended on this site due to steep slopes.
d. Pest control - Porcupines can cause extensive damage and populations should be controlled.
e. Fire hazard - Fire usually not a problem in well-managed, mature stands.

Other products

These trees have provided Indians with food for centuries. The berries have been used by Indians for food.

Other information

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. Thousands of pounds of nuts are gathered each year and sold on commercial markets throughout the United States. 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.

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	55	3	5	–	–	–	

Type locality

Location 1: Lincoln County, NV	
Township/Range/Section	T11S R67E S36
General legal description	Horse Spring area, Mormon Mountains, Lincoln County, Nevada. This site also occurs in northern Clark and southern Lincoln Counties, Nevada.

Other references

Chojnacky, D.C., 1987. Volume and Growth Prediction for Pinyon-juniper; In "Proceedings: P/J Conference" (1986), Reno, NV. General Tech Report INT-215, Ogden, UT. USDA-USFS, Intermtn Res Sta, 1987. pp 207-215.

Fire Effects Information System (Online; http://www.fs.fed.us/database/feis/plants/).

Howell, J., 1940. Pinyon and juniper: a preliminary study of volume, growth, and yield. Regional Bulletin 71. Albuquerque, NM: USDA, SCS; 90p.

Jordan, M., 1974. An Inventory of Two Selected Woodland Sites in the Pine Nut Hills of Western Nevada.

USDA-NRCS. 1980. National Forestry Manual - Part 537. Washington, D.C.

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Contributors

RRK/GKB

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	
Approved by	
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):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

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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:**
