USDA Natural Resources Conservation Service

Ecological site F029XY095NV
PIMO-JUOS WSG 0R0501 12 to 16

Accessed: 05/04/2024

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.

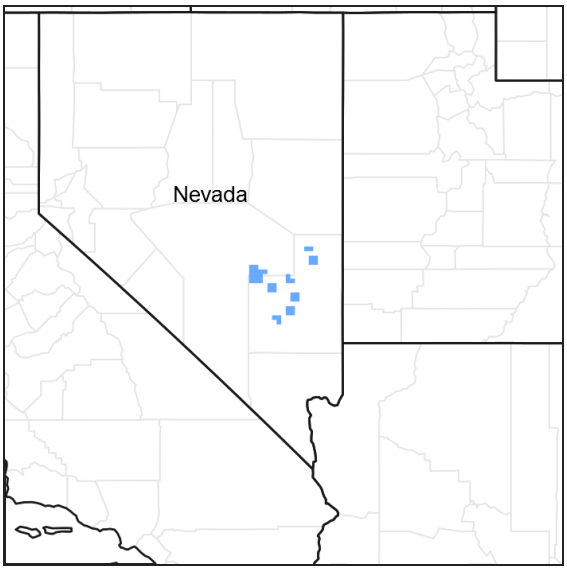


Figure 1. Mapped extent

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.

Table 1. Dominant plant species

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

Physiographic features

This Forest community occurs on mountain summits and sideslopes on all aspects. Slopes range from 15 to 75 percent. Elevations are 5500 to about 8600 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountain
Elevation	1,676–2,621 m
Slope	15–75%
Aspect	Aspect is not a significant factor

Climatic features

The climate associated with this site is arid, characterized by cold, moist winters and warm, dry summers. Average annual precipitation is 12 to about 16 inches. Mean annual air temperature is 44 to 48 degrees F. The average frost-free period is 90 to 110 days. There is no climate station associated with this site.

Table 3. Representative climatic features

Frost-free period (average)	120 days
Freeze-free period (average)	0 days
Precipitation total (average)	406 mm

Influencing water features

There are no influencing awter features associated with this site.

Soil features

Soils of this Forest site are typically shallow to moderately deep, deep and well drained. These soils have extreme amounts of very large, exfoliating ignimbritic boulders on the surface. 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 very high 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. The soil series associated with this site are Brier and Farepeak.

Table 4. Representative soil features

Surface texture	(1) Extremely bouldery sandy loam (2) Extremely cobbly loam (3) Very gravelly loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately slow to moderate
Soil depth	25–102 cm
Surface fragment cover <=3"	20–40%
Surface fragment cover >3"	23–50%
Available water capacity (0-101.6cm)	3.3–4.32 cm
Calcium carbonate equivalent (0-101.6cm)	0–1%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	6.6–8.4
Subsurface fragment volume <=3" (Depth not specified)	23–50%
Subsurface fragment volume >3" (Depth not specified)	35–42%

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 forestlands. This stage of community development is assumed to be representative of this forestland 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.

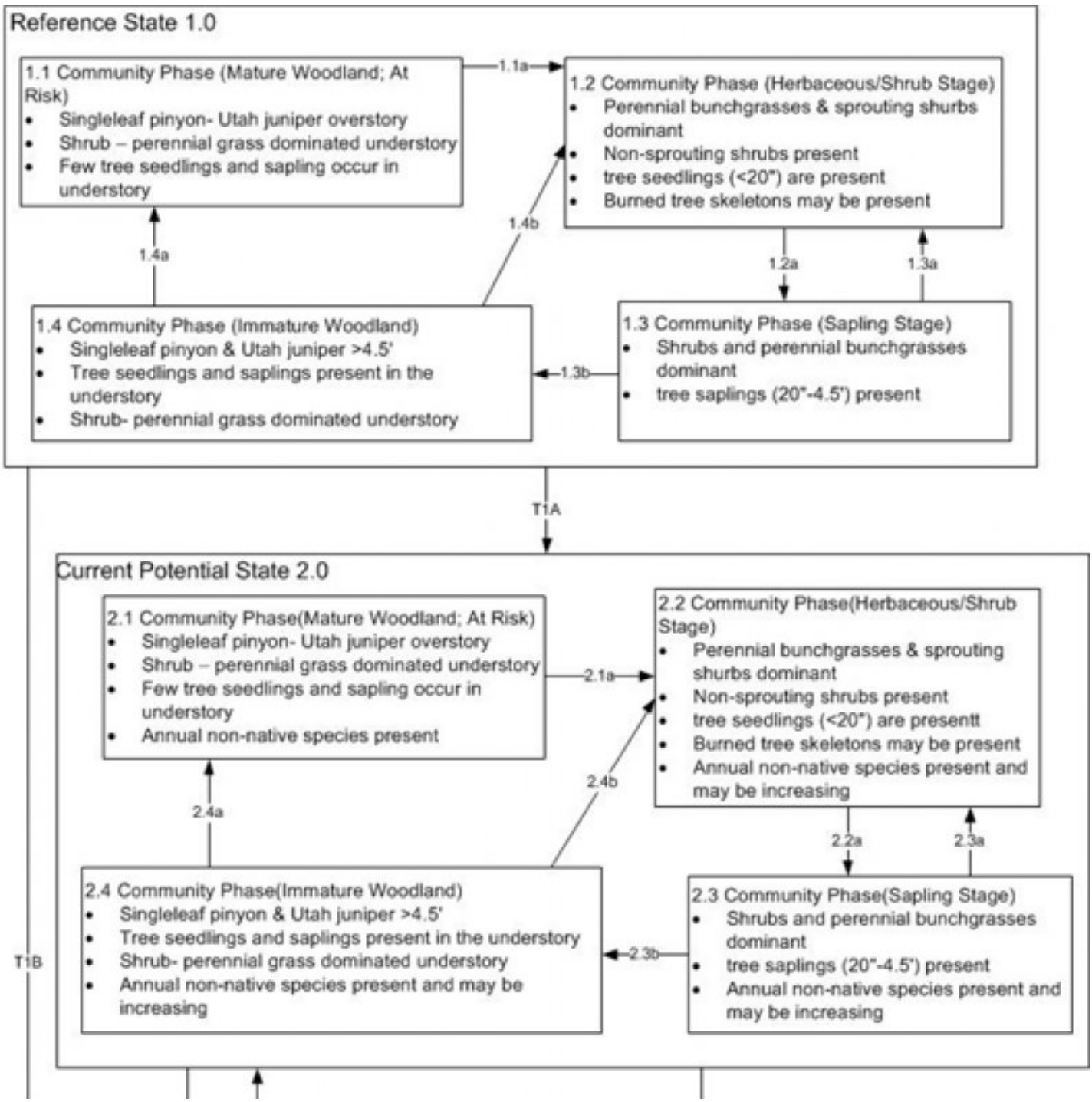
The pinyon-juniper forestland is generally a climax vegetation type throughout its range, reaching climax about 300 years after disturbance, with an ongoing trend toward increased tree density and canopy cover and a decline in understory species over time. Singleleaf pinyon seedling establishment is 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.

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. 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. Mountain big sagebrush is highly susceptible to injury from fire. It is often top-killed by fire and will not resprout. Fire effects on Stansbury cliffrose are variable. Fire may kill or severely damage plants. Late-season fire also increases the risk of mortality. Stansbury cliffrose is a weak sprouter that is generally killed by severe fire. 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. Bottlebrush squirreltail's small size, coarse stems, and sparse leafy material aid in its tolerance of fire. Postfire regeneration occurs from surviving root crowns and from on- and off-site seed sources. Frequency of disturbance greatly influences postfire response of bottlebrush squirreltail. Undisturbed plants within a 6 to 9 year age class generally contain large amounts of dead material, increasing bottlebrush squirreltail's susceptibility to fire. Thurber’s needlegrass is 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.

State and transition model



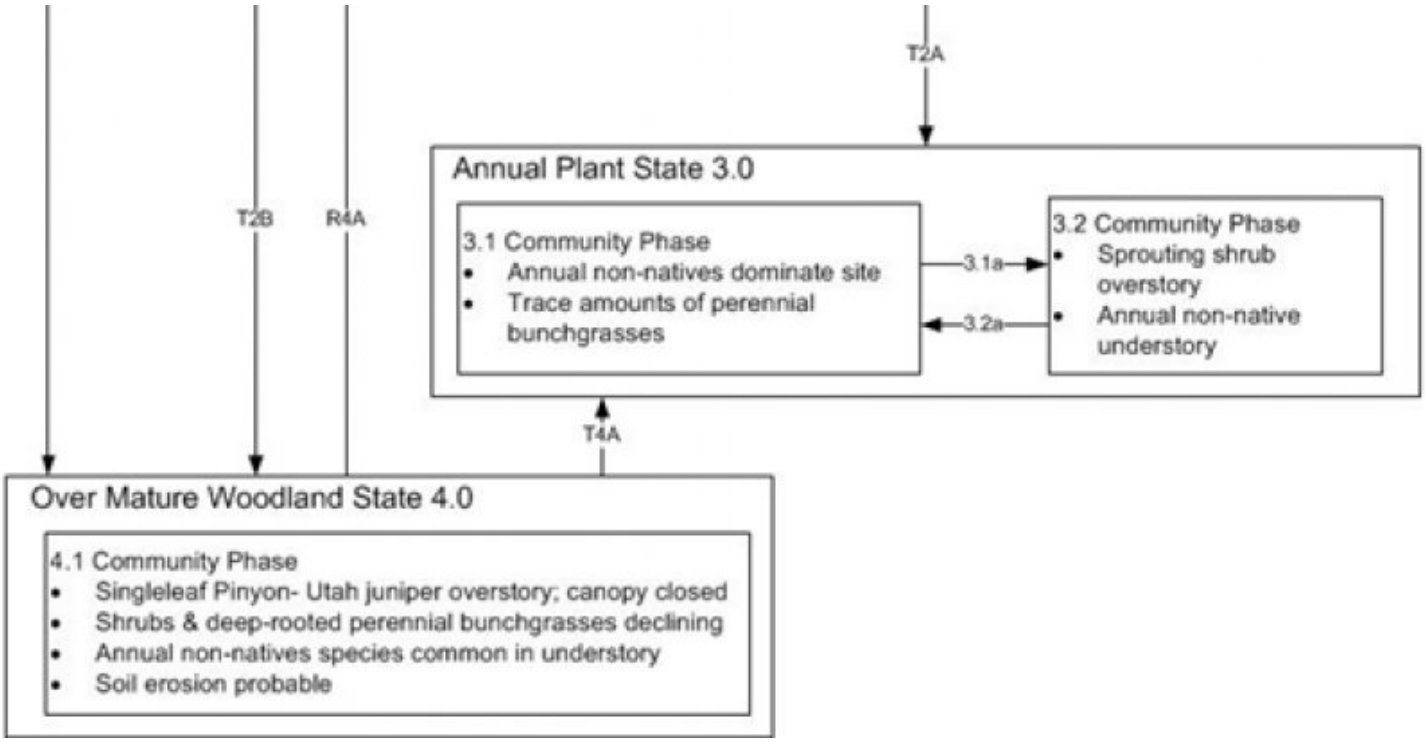


Figure 3. DRAFT STM

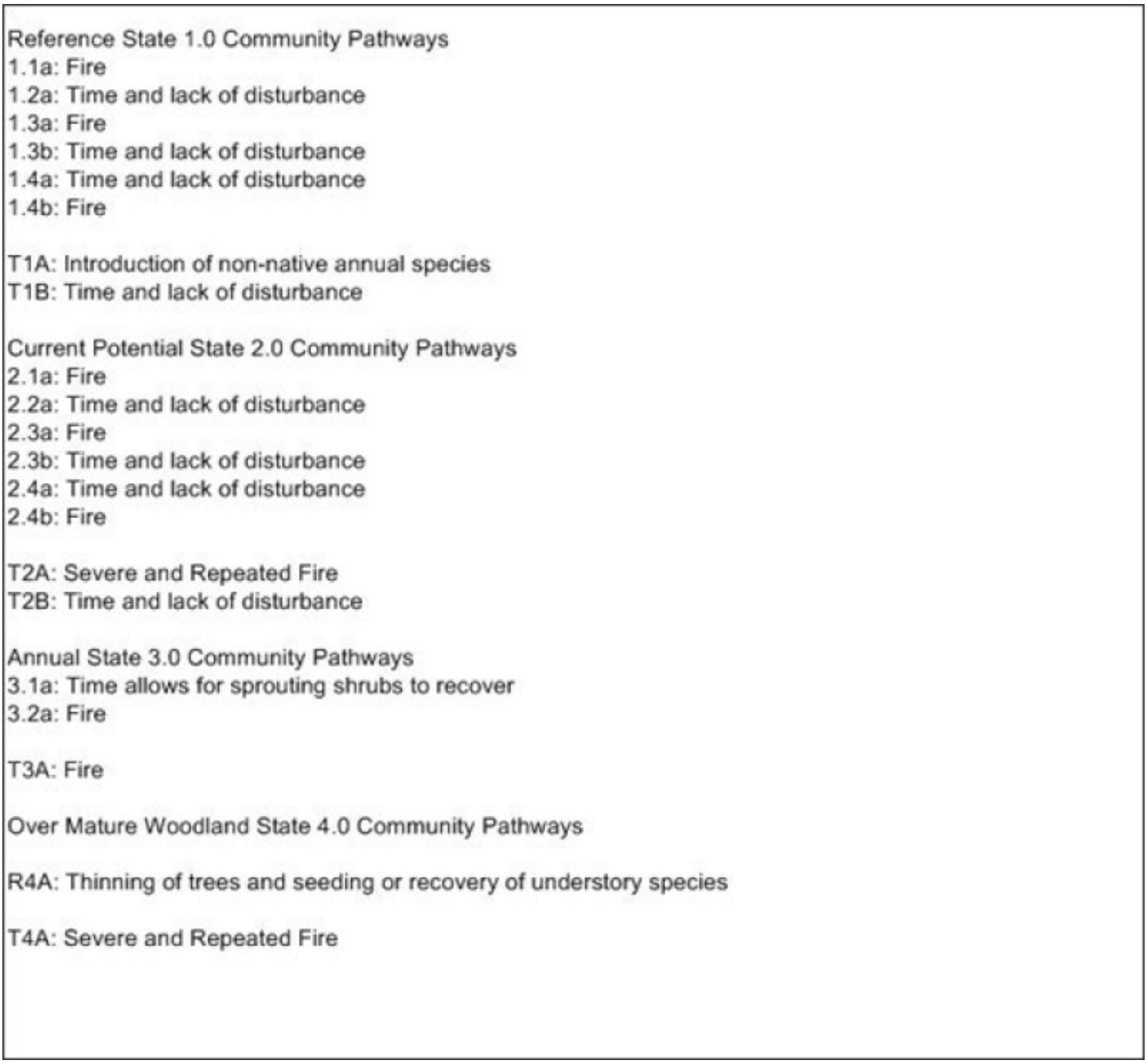


Figure 4. DRAFT STM LEGEND

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 is the principal understory shrub. Muttongrass is the most prevalent understory grass. Overstory tree canopy composition is about 50 to 70 percent singleleaf pinyon and 30 to 50 percent Utah juniper. An overstory canopy cover of about 25 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 40 percent grasses, 10 percent forbs and 50 percent shrubs and young trees when the average overstory canopy is medium (20 to 35 percent). Average understory production ranges from 150 to 350 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)
Grass/Grasslike	67	90	157
Shrub/Vine	67	90	157
Tree	17	22	39
Forb	17	22	39
Total	**168**	**224**	**392**

State 2
Current Potenital 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**			56–114	
	muttongrass	POFE	*Poa fendleriana*	22–54	–
	Sandberg bluegrass	POSE	*Poa secunda*	11–20	–
	Thurber's needlegrass	ACTH7	*Achnatherum thurberianum*	11–20	–
	squirreltail	ELEL5	*Elymus elymoides*	11–20	–
2	**Secondary Perennial Grasses**			7–27	
	pine needlegrass	ACPI2	*Achnatherum pinetorum*	2–11	–
	threeawn	ARIST	*Aristida*	1–2	–
	needle and thread	HECO26	*Hesperostipa comata*	1–2	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	1–2	–
Forb					
3	**Perennial**			7–27	
	goldenweed	PYRRO	*Pyrrocoma*	2–11	–
	milkvetch	ASTRA	*Astragalus*	2–11	–
	buckwheat	ERIOG	*Eriogonum*	1–2	–
	beardtongue	PENST	*Penstemon*	1–2	–
Shrub/Vine					
4	**Primary Shrubs**			45–108	
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	22–54	–
	Stansbury cliffrose	PUST	*Purshia stansburiana*	22–54	–
5	**Secondary Shrubs**			9–45	
	Utah serviceberry	AMUT	*Amelanchier utahensis*	2–11	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	2–11	–
	mormon tea	EPVI	*Ephedra viridis*	2–11	–
	antelope bitterbrush	PUTR2	*Purshia tridentata*	2–11	–
Tree					
6	**Evergreen**			13–31	
	singleleaf pinyon	PIMO	*Pinus monophylla*	11–20	–
	Utah juniper	JUOS	*Juniperus osteosperma*	2–11	–

Animal community

Livestock Interpretations:
This site is not suited to grazing of domestic livestock due to extreme amounts of boulders on the soil surface. Pinyon-juniper woodlands are considered to have poor palatability for cattle, sheep, and horses. Utah juniper is used by and livestock for cover and food. 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. Stansbury cliffrose is an important browse species for livestock, especially in the winter. 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 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. Bottlebrush squirreltail is very palatable winter forage for domestic sheep of Intermountain ranges. Domestic sheep relish the green foliage. Overall, bottlebrush squirreltail is considered moderately palatable to livestock. 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.

Wildlife Interpretations:
This site has high value for mule deer during the summer, fall and early-winter. Juniper and pinyon trees provide shelter from summer heat, winter cold and insects. It is also used by various song birds, rodents, reptiles and associated predators natural to the area.

Hydrological functions

Runoff is Very high. Permeability is moderately slow to moderate.

Recreational uses

The aspect of this site is dominated by very large boulders that inhibit many forms of recreation. The site has potential for hiking, nature study, camping and deer, sheep and upland game hunting.

Wood products

PRODUCTIVE CAPACITY

This forestland community is of low site quality for tree production. Site index ranges from about 40 to 55 (Howell, 1940).

Productivity Class: 0.2 to 0.4
CMAI*: 3.3 to 5.2 ft3/ac/yr;
0.23 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.
Due to severe limitations of this site to tree harvest (steep slopes and high amounts of surface boulders), tree products are not addressed.

MANAGEMENT GUIDES AND INTERPRETATIONS

1. LIMITATIONS AND CONSIDERATIONS
Severe equipment limitations due to steep slopes and the many large boulders on the soil surface.

2. ESSENTIAL REQUIREMENTS
Protect soils from accelerated erosion.

3. SILVICULTURAL PRACTICES
Silvicultural treatments are not economically feasible on this site due to severe limitations for equipment and tree harvest.

Other products

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. Triterpenoids extracted from Stansbury cliffrose have been shown to have inhibitory effects on HIV and Epstein-Barr virus. Native Americans used the inner bark for making clothing and ropes, and the branches for making arrows.

Other information

Stansbury cliffrose is recommended for wildlife, roadside, construction, and mine spoils plantings; and for restoring pinyon-juniper woodland, mountain brushland, basin big sagebrush grassland, black sagebrush, and black

greasewood communities. It can be established on disturbed seedbeds by broadcast seeding, drill seeding, or transplanting. Fall or winter seeding is recommended. Bottlebrush squirreltail is tolerant of disturbance and is a suitable species for revegetation.

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*	40	55	0	1	–	–	–	

Type locality

Location 1: Lincoln County, NV	
Township/Range/Section	T5S R61E S28
General legal description	Section 28, T5S. R62E. MDBM. About 10 air miles northeast of Alamo, South Pahroc Range, Lincoln County, Nevada.

Other references

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.

Contributors

RK

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:**

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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):**

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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:**
