Ecological site F029XY065NV
PIMO-JUOS/ARTRW8

Accessed: 05/02/2024

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.

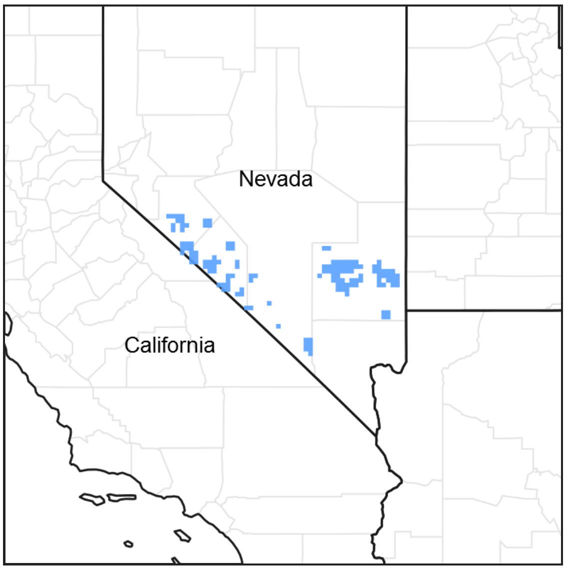


Figure 1. Mapped extent

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.

Classification relationships

Society of American Foresters (SAF) cover type 239.
US National Vegetation Classification (USNVC): 1 Forest and Woodland, 1.C Temperate Forest, 1.C.2 Cool Temperate Forest, D1010 Western North American Cool Temperate Woodland and Scrub, M026 Intermountain Singleleaf Pinyon- Western Juniper Woodland, G247 Great Basin Pinyon- Juniper Woodland Group. The closest NVC associations are as follows: CEGL000832 PIMO-JUOS/ARTR2 woodland (Community Phase 1.1 and 1.5).

Associated sites

F029XY069NV	**PIMO-JUOS WSG 0R0504 12 to 16** PIMO-JUOS/ARNO4/POFE
F029XY071NV	**Shallow Rocky Loam 10-12" P.Z.** JUOS/ARNO4-PUST/ACHY
R029XY010NV	**LOAMY SLOPE 8-10 P.Z.** ARTRW/ACHY-HECO26
R029XY029NV	**LOAMY 10-12 P.Z.** ARTR2/HECO26-ACHY

Similar sites

F029XY067NV	**PIMO-JUOS WSG 0R0501 12 to 16** Higher site index. AMUT and GAFL2 dominant understory shrubs.
F029XY069NV	**PIMO-JUOS WSG 0R0504 12 to 16** ARNO4 dominant understory shrub.
F029XY070NV	**Shallow Loam 10-14 P.Z.** JUOS dominated overstory, PIMO minor component.

Table 1. Dominant plant species

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

Physiographic features

This site occurs on sideslopes and summits of hills and low mountains on all aspects. Slopes range from 4 to over 50 percent, but slope gradients of 30 to 50 percent are typical. Elevations are 5500 to about 7200 feet. This site is typically found on shallow, rocky hills and is associated with areas of rock outcrop (ignimbrites, volcanic tuffs, etc.).

Table 2. Representative physiographic features

Landforms	(1) Mountain slope (2) Hill
Flooding frequency	None
Ponding frequency	None
Elevation	1,676–2,195 m
Slope	4–50%
Aspect	Aspect is not a significant factor

Climatic features

The climate of this area is largely influenced by topographical barriers. The Sierra Nevada mountain drain much of the moisture from storms moving from the Pacific. The Rocky Mountains divert cold air masses from the Great Basin. This area also lies in the path of warm, moist air masses from the Gulf of Mexico. Consequently eastern

Nevada can expect an average of 20 to 25 thunderstorm days per year, mostly during July through September. As much as 25 percent of the average annual precipitation occurs from July through September.
The climate associated with this site is semiarid, characterized by cold winters and warm, intermittently moist summers. Average annual precipitation is 10 to 14 inches. Mean annual air temperature is 40 to 57 degrees F. The average frost-free period is 90 to 130 days.
Average monthly precipitation (inches) for Pioche NV (266252):
Jan (1.55), Feb (1.48), March (1.59), April (1.05), May (0.96), June (0.38), July (1.00), Aug (1.35), Sept (0.91), Oct (1.03), Nov (1.01), Dec (1.29)

Table 3. Representative climatic features

Frost-free period (average)	170 days
Freeze-free period (average)	205 days
Precipitation total (average)	356 mm

Influencing water features

There are no influencing water features associated with this site.

Soil features

Soil Features Narrative:
The soils associated with this site are shallow and well drained. They are formed in residuum and colluvium derived from volcanic rocks. These soils are skeletal with 35 to over 50 percent gravels, cobbles or stones, by volume, distributed throughout their profile. Available water capacity is very low to 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 (gravels, cobbles, stones and some boulders) at the soil surface which occupy plant growing space, yet help to reduce evaporation and conserve soil moisture. Runoff is medium or rapid and potential for sheet and rill erosion is moderate to severe depending on slope. Coarse fragments on the soil surface provide a stabilizing effect on surface erosion conditions. The soils are moist in the winter and early spring months and dry in summer and fall except for 10 to 20 days cumulative between July and October due to convection storms. The soils have an aridic soil moisture regime bordering on xeric.
Soil series associated with this site include: Brier, loamy-skeletal, mixed, superactive, mesic Aridic Lithic Argixerolls.

Table 4. Representative soil features

Parent material	(1) Residuum–volcanic breccia (2) Colluvium–volcanic breccia
Surface texture	(1) Very cobbly loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately rapid
Soil depth	25–38 cm
Surface fragment cover <=3"	20–30%
Surface fragment cover >3"	22–32%
Available water capacity (0-101.6cm)	3.3–5.08 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0 mmhos/cm

Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	7.2–7.4
Subsurface fragment volume <=3" (Depth not specified)	20–25%
Subsurface fragment volume >3" (Depth not specified)	27–32%

Ecological dynamics

The community phases of this site are dynamic in response to changes in disturbance regimes and weather patterns. In general, pinyon-juniper forests have an open canopy with a low producing shrub understory. Fire plays an important role in all forest ecosystems. Important processes regulated by fire include regeneration and reproduction, seedbed preparation, competition reduction and thinning to maintain stand health (Spurr and Barnes 1964). Individual trees on this site are likely greater than 200 years old, indicating that stand replacing disturbances are uncommon. Pinyon and juniper commonly grow together, but juniper species are considered to exhibit higher drought tolerance. Juniper tends to dominate the lower elevations of their range and community structure shifts to pinyon with increasing elevation (Zouhar 2001).

The distributions of pinyon and juniper forests have undergone many changes in prehistoric and historic times and these communities continue to change in modern times. It is also true that any assessment of pinyon and juniper distribution is only a snapshot of a plant community in motion (Zouhar 2001). Expansions in the spatial extent of pinyon-juniper communities in recent times have been contributed to many variables including distribution by birds, centuries of livestock grazing, changes in fire frequency and climate change. Currently, pinyon-juniper forests are defined as being dominated by pre-settlement trees, those that established prior to 1860. Trees that established after the rapid settlement of the West in the late 1860's and 1870's are defined as post-settlement (Miller et al. 1999). True old-growth pinyon-juniper forests should be defined on the basis of tree age, and stand structure and function (Miller et al. 1999).

Old forests usually differ in structure and function from young forests, however wildlife studies have generally not separated postsettlement from presettlement pinyon-juniper forests. Age of individual trees is used to separate pre- and postsettlement forests. Old growth can also be based on the structural characteristics of the tree. With age, trees develop broad asymmetrical tops and rounded canopies. Old trees also exhibit deeply furrowed bark, twisted trunks or branches, dead branches, large lower limbs, hollow trunks, large diameter to height ratios and bright yellow lichens on the branches. Western and Utah juniper can attain ages 1,000 years and greater and pinyon 600 years (Bowns 1999). Fire policies influencing these old stands should be evaluated on an individual stand basis and should include both suppression and let burn.

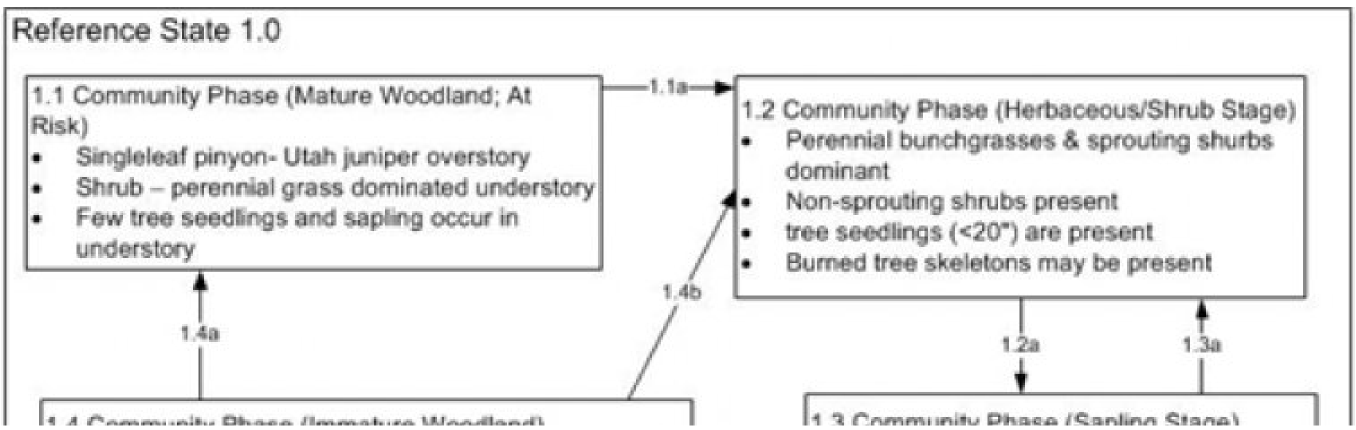
The pinyon-juniper forestland is generally a climax vegetation type throughout its range, reaching climax about 300 years after disturbance, with an ongoing trend toward increased tree density and canopy cover and a decline in understory species over time. Singleleaf pinyon and Utah juniper seedling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

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 by the tree canopy and

litter layer also reduces the temperature fluctuation from day to night (Fisher and Binkley 2002). Soils associated with this ecological site have =50% rock fragments (mostly gravels, cobbles and stones, with few boulders) distributed on the soil surface and throughout the profile, these rock fragments affect infiltration. Infiltration rate determines amount of water stored in the soil and available to plants and the amount of water available for overland flow and watershed runoff (Brakensiek and Rawls 1994). Many factors influence infiltration rates, such as, vegetative cover, porosity of the rock type, micro-topography and duration and size of storm events. Wilcox (1988) reports the smaller the rock size the more significant and negative the relationship is with infiltration. They concluded that in situations where rock cover inhibits infiltration, it is most likely when smaller fragments dominate. Therefore, it is reasonable to assume on this ecological site rock fragments do not drastically inhibit infiltration because all size classes are represented.
In pinyon and juniper forests, alternating canopy and inter-canopy patches influence soil moisture and temperature variability. Center portions of canopy patches receive less solar radiation than inter-canopy patches, influencing the kinds and proportions of vegetation growing there. Canopy and inter-canopy patches interact with the kind of precipitation event to influence soil moisture. Generally snow cover is greater in inter-canopy patches, indicating greater soil moisture. However, during rainfall events large enough to generate runoff and stem flow, canopy locations are much wetter than the inter-canopy spaces (Breshears et al. 1997). As the overstory becomes more dense, effects on soil moisture and solar radiation influence understory vegetation. Species diversity and understory production decrease with increased shading. 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:
Singleleaf pinyon and Utah juniper are highly susceptible to fire damage. Both have thin, highly flammable bark that provides little protection to the cambium and lack self-pruning branches. Generally pinyon-juniper forests occur on shallow, rocky soils, where fires are infrequent and unpredictable. Years with exceptional rainfall lead to increased herbaceous growth and allows for wildfires to spread. Small trees are more susceptible to mortality from wildfire. Reestablishment occurs solely from seed, rodents and birds often store large amounts of seed. Rate of reestablishment largely depends on size, season, intensity of fire, as well as, age of trees when burned. Mature trees produce more seed and therefore build up the seed bank in the soil and increase the rate of return. Reestablishment may take 50 to 100 years to reach pre-fire densities.
On fire-safe sites, large trees can monopolize site resources over a life span of 350 years or more. Dominant pinyons are often 400 years old and have been known to reach 800 to 1000 years. Mature singleleaf pinyon trees (over 200 years) are relatively uncommon. Utah juniper may live to 600 years or more.
Wyoming big sagebrush and Mountain big sagebrush are killed by fire and reestablishes from soil stored seed, from seed produced by remnant plants that escaped fire, and from plants adjacent to the burn that seed in. Utah serviceberry may be slightly harmed by fire, depending on moisture conditions, but is generally considered to be fire tolerant. Desert bitterbrush recovers from fire by sprouting from surviving root crowns and by establishing from seed. Utah serviceberry, ephedra and Stansbury cliffrose sprout from the root crown following fire and may temporally increase following .wildfire. Perennial bunchgrasses generally respond favorably to fire, increasing in cover and vigor. Muttongrass is unharmed to slightly harmed by light-severity fires, but is harmed by and slow to recover from severe fire. Sandberg's blugrass is generally unharmed by fire. Its small size and sparse litter reduces the amount of heat transferred to the perennating buds in the soil (Howard 1997). Indian ricegrass can be killed by fire, depending on severity and season of burn. It readily reestablishes on burned sites through seed dispersed from adjacent unburned areas. Soil moisture is important to aid recovery of native plants following wildfire.

State and transition model



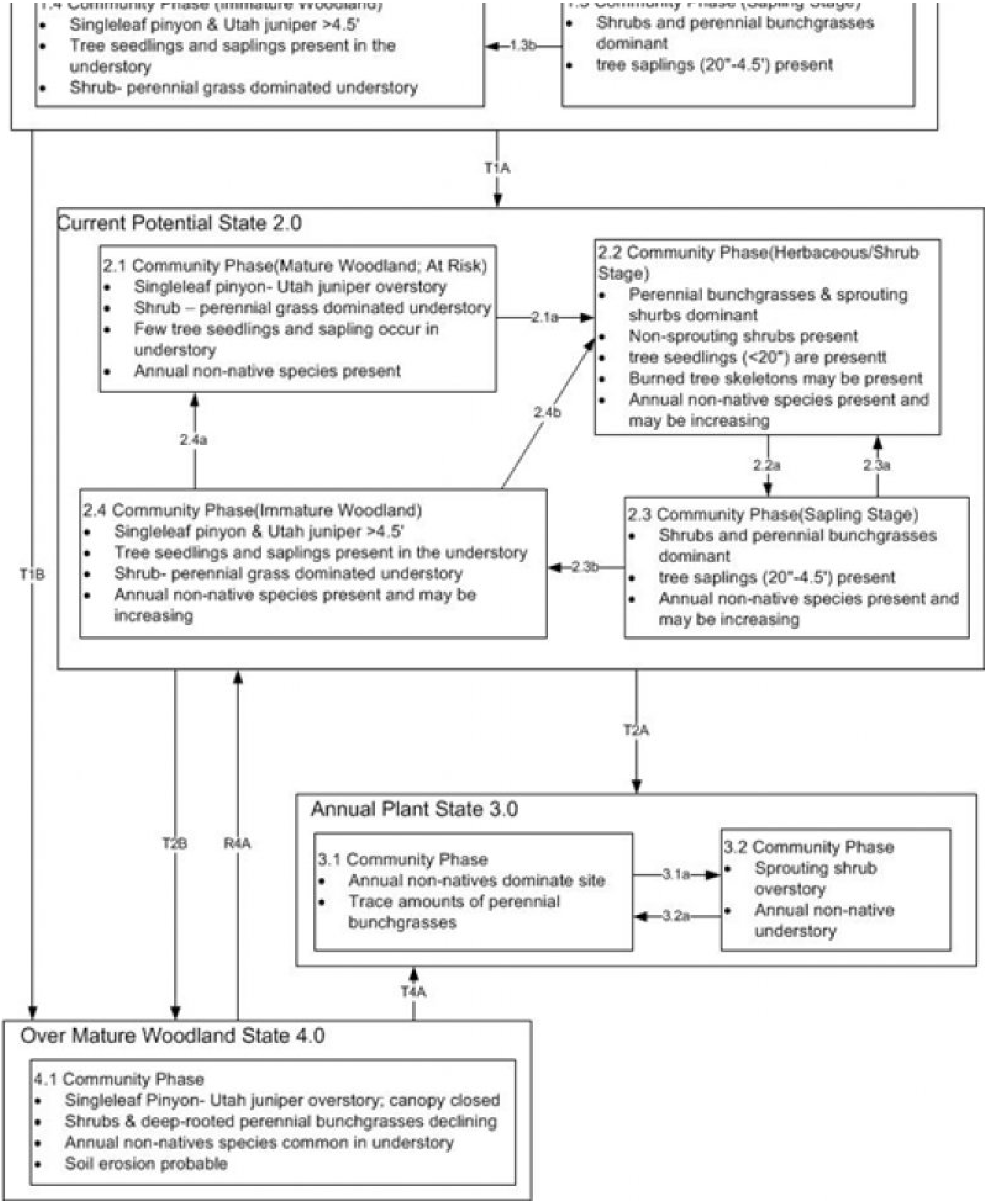


Figure 3. DRAFT STM

Reference State 1.0 Community Pathways
1.1a: Fire
1.2a: Time and lack of disturbance
1.3a: Fire
1.3b: Time and lack of disturbance
1.4a: Time and lack of disturbance
1.4b: Fire

T1A: Introduction of non-native annual species
T1B: Time and lack of disturbance

Current Potential State 2.0 Community Pathways
2.1a: Fire
2.2a: Time and lack of disturbance
2.3a: Fire
2.3b: Time and lack of disturbance
2.4a: Time and lack of disturbance
2.4b: Fire

T2A: Severe and Repeated Fire
T2B: Time and lack of disturbance

Annual State 3.0 Community Pathways
3.1a: Time allows for sprouting shrubs to recover
3.2a: Fire

T3A: Fire

Over Mature Woodland State 4.0 Community Pathways

R4A: Thinning of trees and seeding or recovery of understory species

T4A: Severe and Repeated Fire

Figure 4. DRAFT STM LEGEND

State 1
Reference State

The reference state is representative of the natural range of variability under naturally stable, pre-European settlement conditions. This state is dominated by singleleaf pinyon pine (*Pinus monophylla*) and Utah Juniper (*Juniperus osteosperma*). Primary natural disturbances affecting this ecological site are wildfire, disease, insect attack and periodic drought. Timing of fire combined with weather events determines community dynamics. This site may experience light to moderate grazing by wildlife. Pinyon-juniper habitat is generally arid and species are adapted to receiving limited annual precipitation. Overall, drought related mortality is low in this habitat type. Increased mortality following drought is likely caused by a combination of drought, insect attack and disease. Prolonged drought will result in an overall decline in the grass-forb-shrub community components and reduced annual growth of mature pinyon and juniper.

Community 1.1
Reference Community Phase (mature woodland)

The reference community is considered to be representative of this ecological site under naturally stable, pre-European settlement conditions. Plant community composition and structure is dominated by singleleaf pinyon pine and Utah juniper that have reached or are near maximal heights for the site. Tree canopy cover ranges from 15 to

25 percent. Overstory tree canopy composition is about 50 to 70 percent Utah juniper and 30 to 50 percent singleleaf pinyon pine. Upper crowns of dominant and co-dominant trees are typically either irregularly or smoothly flat-topped or rounded. Understory vegetation is strongly influenced by tree competition, overstory shading, duff accumulation, etc. Effects on the understory include overall reduction in canopy cover and annual production. Reduction in the density of shrubs resulting in larger interspaces is the effect of competition for light, water and nutrients with a mature forest and should be considered a natural part of forest development.Infrequent, yet periodic, wildfire is presumed to be a natural factor influencing the understory of mature pinyon-juniper forests. Wyoming big sagebrush (*Artemisia tridentata* supsp. wyomingensis) is the principal understory shrub. Additional shrub species found on this ecological site include desert bitterbrush (Prushia glandulosa), Utah serviceberry (*Amelanchier utahensis*), ephedra (*Ephedra viridis*), Stansbury cliffrose (*Purshia stansburiana*) and mountain big sagebrush (*A. tridentata* subsp. vaseyana) may occur at the upper elevations of this site. Muttongrass (*Poa fendleriana*), Sandberg's bluegrass (*Poa secunda*) and needlegrasses (Achnatherum spp.) are the most prevalent understory grasses. Perennial forbs account for a relatively small percentage of the community composition, but species include buckwheat (Eriogonum spp.), phlox (Phlox spp.), globemallow (Sphaeralcea spp.) and flax (Linum spp.).

Forest overstory. The visual aspect and vegetal structure are dominated by singleleaf pinyon and Utah juniper. 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 15 to 25 percent. This stage of community development is assumed to be representative of this forest community under naturally stable, pre-European settlement conditions.

Forest understory. Understory vegetative composition is about 30 percent grasses, 10 percent forbs and 60 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	112	168	280
Grass/Grasslike	67	101	168
Forb	22	34	56
Tree	22	34	56
Total	**223**	**337**	**560**

Community 1.2
Herbaceous/Shrub

The vegetation of this community phase is dominated by grasses and forbs under an open canopy of full sunlight. This community phase occurs one to three years after a stand replacing disturbance, such as crown fire. Standing snags remaining after fire or residual trees left following harvest have little or no affect on the composition and production of the herbaceous vegetation, but can provide important wildlife habitat. Perennial grasses respond favorably to disturbances which remove competition from trees and shrubs. This plant community is at risk of invasion by non-native species. Non-native species easily take advantage of increased available resources following wildfire or other disturbance. Wildfire, especially high intensity wildfire, can negatively impact dynamic soil properties. Removal of litter during wildfire reduces soil organic matter which results in decreased soil aggregate stability and infiltration rates increasing site susceptibility to water and wind erosion, immediately following disturbance (Tugel et al. 2008).

Community 1.3
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. Saplings and immature trees have full, pyramid shaped crowns. Open canopy allows understory vegetation to be dominated by grasses, forbs and shrubs, in association with trees.

Sprouting shrubs such as bitterbrush, serviceberry and ephedra are the dominant woody vegetation. However, in some cases enough time has passed for shrub species dependent on seed for regeneration, such as Wyoming big sagebrush, to return to this plant community phase.

Community 1.4
Immature Forest

Singleleaf pinyon and Utah juniper form a major constituent of the visual aspect of the community composition and structure. Seedlings and saplings of singleleaf pinyon and Utah juniper are prevalent in the understory. Understory vegetation is moderately influenced by shading from the overstory canopy of about 15 to 20 percent, reducing the density and production of grasses, forbs and shrubs. Sufficient time has passed for species dependent on seed for regeneration to comprise a major component of the understory.

State 2
Current Potential State

State 3
Annual Plant 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**			34–61	
	muttongrass	POFE	*Poa fendleriana*	17–30	–
	Sandberg bluegrass	POSE	*Poa secunda*	17–30	–
2	**Secondary Perennial Grasses**			15–71	
	needlegrass	ACHNA	*Achnatherum*	3–17	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	3–17	–
	blue grama	BOGR2	*Bouteloua gracilis*	3–17	–
	squirreltail	ELEL5	*Elymus elymoides*	3–17	–
	prairie Junegrass	KOMA	*Koeleria macrantha*	3–17	–
	James' galleta	PLJA	*Pleuraphis jamesii*	1–3	–
Forb					
3	**Perennial**			27–64	
	buckwheat	ERIOG	*Eriogonum*	17–30	–
	Lewis flax	LILE3	*Linum lewisii*	3–17	–
	lobeleaf groundsel	PAMU11	*Packera multilobata*	3–17	–
	phlox	PHLOX	*Phlox*	3–17	–
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	3–17	–
	aster	ASTER	*Aster*	3–17	–
Shrub/Vine					
4	**Primary Shrubs**			135–279	
	Wyoming big sagebrush	ARTRW8	*Artemisia tridentata ssp. wyomingensis*	84–168	–
	desert bitterbrush	PUGL2	*Purshia glandulosa*	34–81	–
5	**Secondary Shrubs**			10–50	
	Utah serviceberry	AMUT	*Amelanchier utahensis*	3–17	–
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	3–17	–
	mormon tea	EPVI	*Ephedra viridis*	3–17	–
	snakeweed	GUTIE	*Gutierrezia*	3–17	–
	Stansbury cliffrose	PUST	*Purshia stansburiana*	3–17	–
	spineless horsebrush	TECA2	*Tetradymia canescens*	3–17	–
Tree					
6	**Evergreen**			20–47	
	singleleaf pinyon	PIMO	*Pinus monophylla*	17–30	–
	Utah juniper	JUOS	*Juniperus osteosperma*	3–17	–

Animal community

Livestock Interpretations:
This site is not well suited to cattle or sheep grazing due to steep slopes. Many areas are not used because of lack of adequate water. 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. Livestock browse Wyoming big sagebrush, but may use it only lightly when palatable herbaceous species are available.

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:
Pinyon-juniper forests provide shelter and forage for numerous species of wildlife, some of which may be obligate to these forests such as pinyon mice and woodrats. The quantity and variety of species using the pinyon-juniper forests changes with succession. These forests have value as habitat for several large mammals such as mule deer, pronghorn, bighorn sheep, wild horses, mountain lions, and bears. Gray foxes, bobcats, coyotes, weasels, skunks, badgers, and ringtails search for prey here. Many species of birds and reptiles find food and shelter here. Pinyon-juniper forests are important wintering areas for Clark's nutcrackers.
Wyoming big sagebrush is preferred browse for wild ungulates.

Hydrological functions

Runoff is medium to high and permeability is moderately high.

Recreational uses

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

Wood products

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.
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.

PRODUCTIVE CAPACITY

This forest community is of low site quality for tree production. Site index ranges from 25 to 40 (Howell, 1940).

Productivity Class: 0.2 to 0.3
CMAI*: 2.0 to 4.5 ft3/ac/yr;
0.15 to 0.31 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.

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 woodland.

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

3. SILVICULTURAL PRACTICES
Silvicultural treatments are not reasonably applied on this site due to poor site quality and severe limitations for equipment and tree harvest.

Other products

Other important uses for singleleaf pinyon are for Christmas trees and as a source of nuts for wildlife and human food. Pinyon-juniper ecosystems have had subsistence, cultural, spiritual, economic, aesthetic and medicinal value to Native American peoples for centuries, and singleleaf pinyon has provided food, fuel, medicine and shelter to Native Americans for thousands of years. The pitch of singleleaf pinyon was used as adhesive, caulking material, and a paint binder. It may also be used medicinally and chewed like gum. Pinyon seeds are a valuable food source for humans, and a valuable commercial crop. 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.

Christmas trees: 5 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 150 to 200 pounds per acre in favorable years.

Native peoples 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*	25	45	2	5	–	200	–	

Type locality

Location 1: Lincoln County, NV	
Township/Range/Section	T5S R69E S33
General legal description	About 2½ miles east of Pine Canyon Reservoir, Gum Hills area, Clover Mountains, Lincoln County, Nevada.

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Contributors

HA/RRK

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):**

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:**