Ecological site R030XC035NV
LOAMY 9-11 P.Z.

Last updated: 2/25/2025
Accessed: 05/14/2025

General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

Ecological site concept

This site occurs on inset fans. Slopes range from 2 to 15 percent, but slope gradients of 2 to 8 are most typical. Elevations range from 5900 to 6600 feet. The soils associated with this site are deep to very deep, well drained, and formed in alluvium derived from limestone.

Similar sites

R030XC046NV	**LOAMY SLOPE 9-11 PZ** BOGR2 important grass; less productive, occurs on sideslopes.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata ssp. vaseyana*
Herbaceous	(1) *Hesperostipa comata* (2) *Achnatherum hymenoides*

Physiographic features

This site occurs on inset fans. Slopes range from 2 to 15 percent, but slope gradients of 2 to 8 are most typical. Elevations range from 5900 to 6600 feet.

Table 2. Representative physiographic features

Landforms	(1) Inset fan
Elevation	1,798–2,012 m
Slope	2–8%

Climatic features

The climate is semiarid with cool, moist winters and warm intermittently moist summers. Precipitation is greatest in the winter with a lesser secondary peak in the summer, typical of the Mojave Desert transitional to the Great Basin. Average annual precipitation is 9 to 11 inches. Mean annual air temperature is 46 to 54 degrees F. The average growing season is about 90 to 135 days.

Table 3. Representative climatic features

Frost-free period (average)	150 days
Freeze-free period (average)	

Precipitation total (average)	279 mm

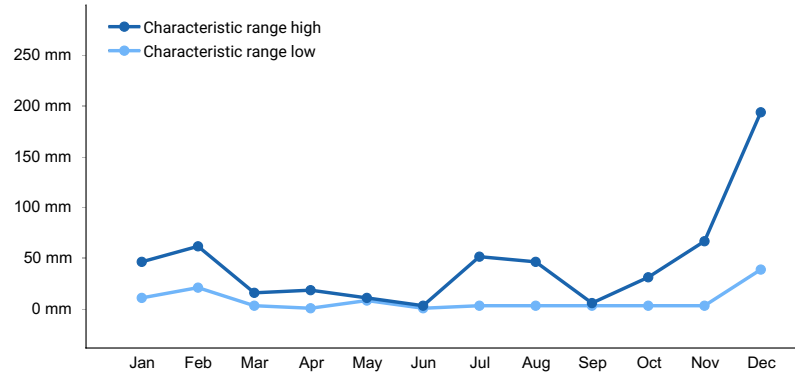


Figure 1. Monthly precipitation range

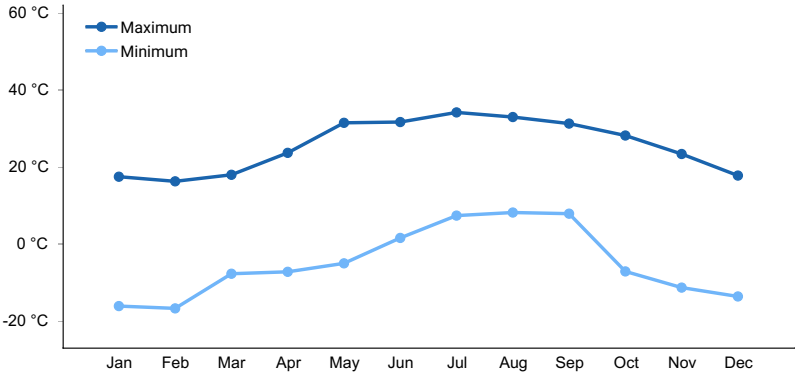


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site are deep to very deep, well drained, and formed in alluvium derived from limestone. The available water holding capacity is moderate and runoff is low. The soil temperature regime is mesic and the soil moisture regime is aridic bordering on ustic. The soil surface is covered by approximately 30 to 60 percent gravels. Run-in moisture positively influences available soil moisture. Soils correlated to this ecological site are classified as coarse-loamy, carbonatic, mesic Ustic Haplocambids.

Table 4. Representative soil features

Parent material	(1) Alluvium–limestone
Surface texture	(1) Very gravelly loam (2) Gravelly fine sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate
Soil depth	152–213 cm
Surface fragment cover <=3"	30–60%
Surface fragment cover >3"	0–5%
Available water capacity (0-101.6cm)	11.94–19.23 cm

Calcium carbonate equivalent (0-101.6cm)	40–55%
Electrical conductivity (0-101.6cm)	0–2 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–5
Soil reaction (1:1 water) (0-101.6cm)	7.9–8.3

Ecological dynamics

The plant communities of this site are dynamic in response to changes in disturbance regimes and weather patterns. Plant community structure is controlled in part by infrequent wildfire and in part by pulses of seedling recruitment. Mountain big sagebrush grows at relatively high elevations and precipitation zones, when compared to other species of big sagebrush. It is commonly associated with pinyon pine, juniper, mountain browse and ponderosa pine habitats. Sagebrush species set seed in the late summer and fall. Seeds ripen from September through October and fall from the plant. Cold, moist conditions and exposure to light increase germination in the spring (Johnson 2000). Seeds of sagebrush species are best adapted to germinate in habitats with conditions similar to that of the collection site (USDA-NRCS 2011). Survival of sagebrush seedlings is dependent on adequate moisture conditions. Young plants are susceptible to less than desirable conditions for several years following germination.

Mountain big sagebrush communities are generally long-lived, therefore it is not necessary for new individuals to recruit every year for perpetuation of the stand. Infrequent large recruitment events and simultaneous low, continuous recruitment is the foundation of population maintenance (Noy-Meir 1973). Mature properly functioning sagebrush communities have higher infiltration rates and lower sediment production, than degraded systems. Reoccurring disturbances, natural or anthropogenic, will result in decreased sagebrush cover and increased cover of disturbance tolerant shrubs and non-natives. Loss of structural and functional groups affects ecosystem functioning and can result in soil loss.

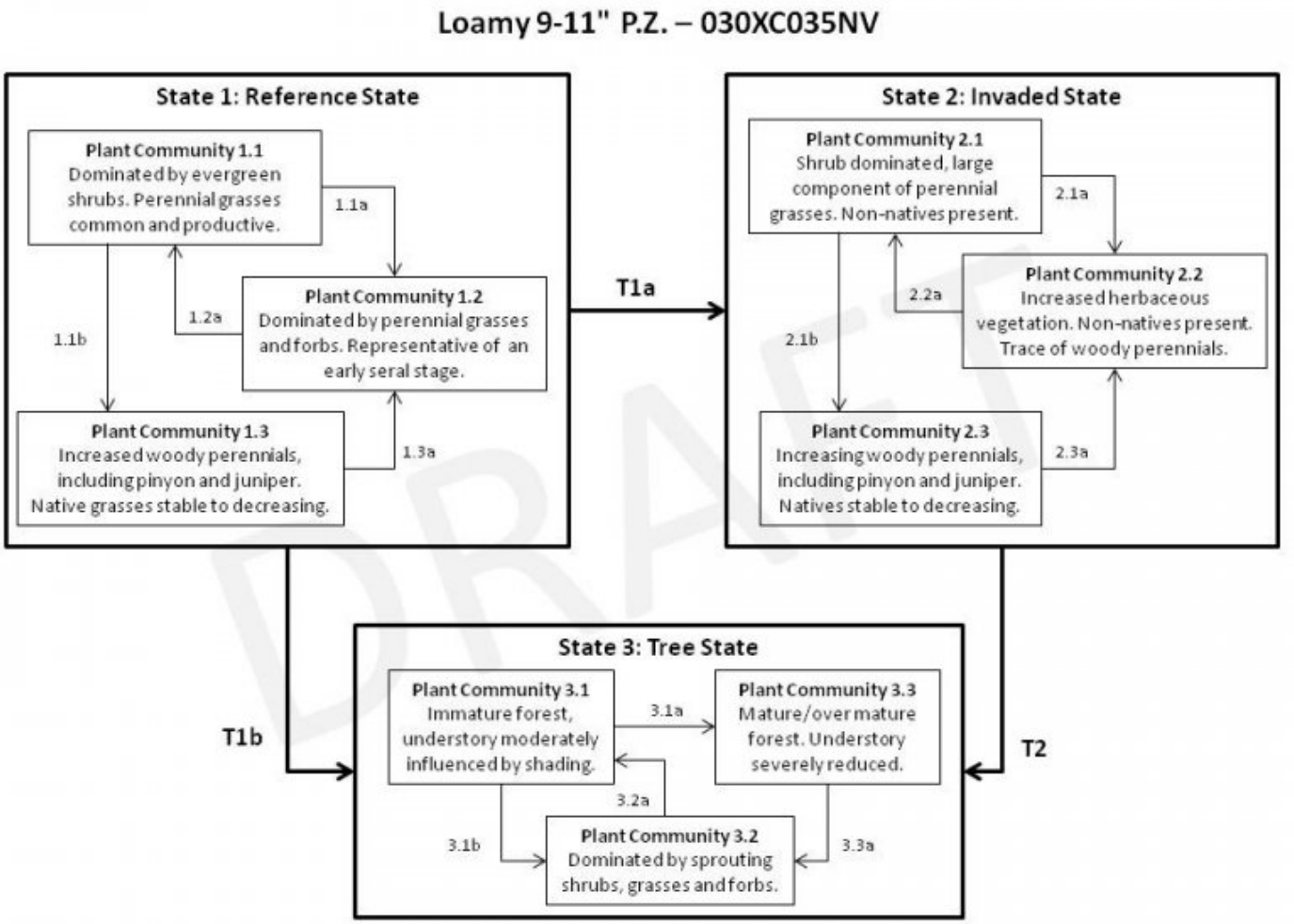
Carbon and nitrogen concentrations are higher under sagebrush canopies when compared to interspaces (Chen and Stark 2000). The root systems of sagebrush maximizes water uptake with a deep taproot and shallow branching roots. The combination of deep and shallow roots also provides excellent soil stabilization. The breakdown of aging roots also contributes to organic matter and nutrient cycling in the sagebrush system.

Fire Ecology:

Pre-settlement fire return intervals in mountain big sagebrush communities varied from 15 to >50 years (Johnson 2000). Mountain big sagebrush is readily killed by wildfire and depends on seed for regeneration. Periodic wildfire helps to maintain the balance between structural and functional groups in the plant community. Lack of naturally occurring wildfires will result in decadent sagebrush stands and loss of important understory species. Long-term exclusion of wildfire may also result in invasion of pinyon and juniper. However, drastically shorter fire return intervals will result in loss of the shrub community and an increase in annual biomass. Species likely to invade this site include non-native annuals, such as cheatgrass.

Mountain big sagebrush is readily killed by fire and does not resprout. Regeneration solely occurs from seedling establishment which is dependent on favorable climatic conditions and seed source. Ephedra and desert ceanothus are tolerant of fire and may increase following burning. Ephedra sprouts vigorously from the root crown following disturbance and is also capable of establishing from seed. Desert ceanothus is a weak sprouter, but it's seeds require scarification and germinate profusely the first spring after fire. Fire reduces the dominance of mountain big sagebrush and alters plant community composition for the first few years. If non-natives have not altered successional pathways, mountain big sagebrush will recover and vegetation returns to its previous composition (Johnson 2000). Needleandthread can be slightly to severely damaged by fire. It sprouts from the caudex following fire, if heat has not been sufficient to kill underground parts. Recovery usually takes 2 to 10 years. Indian ricegrass can be killed by fire, depending on severity and season of burn. Indian ricegrass reestablishes on burned sites through seed dispersed from adjacent unburned areas. Blue grama has variable fire tolerance; it has fair tolerance when dormant but experiences some damage if burned during active growth, especially during drought. Fire generally favors blue grama, generally increasing its occurrence, production, and percent cover.

State and transition model



State 1
Reference State

The reference state is representative of the natural range of variability under pristine conditions. It is dominated by an evergreen shrub community with a significant amount of perennial grass. Plant community phase changes are primarily driven by periodic wildfire, insect/disease attack and long-term drought. Plant community dynamics are driven by interactions between climatic patterns and disturbance regimes.

Community 1.1
Reference Plant Community

Figure 3. reference plant community

The reference plant community is dominated by mountain big sagebrush and is characteristic of a mid-seral, healthy condition. Needleandthread and Indian ricegrass are important associated species. The historic fire return interval for mountain big sagebrush communities ranges from 15 to >50 years. Establishment of sagebrush occurs solely from seed and recruitment pulses are episodic, based on favorable climatic conditions. Potential vegetative composition is approximately 60 percent shrubs, 30 percent perennial native grasses and 10 percent forbs.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	404	538	673
Grass/Grasslike	202	269	336
Forb	67	90	112
Total	**673**	**897**	**1121**

Community 1.2
Plant Community 1.2

This plant community is representative of a post-disturbance, early seral community phase. It is characterized by increased herbaceous vegetation and decreased woody perennials. Sprouting shrubs quickly recover and provide favorable conditions for establishment of other shrub seedlings, such as mountain big sagebrush. Fast moving, low intensity fires result in the incomplete removal of mountain big sagebrush and allows for direct reestablishment through on-site seed source. Needleandthread grass may temporally decrease following wildfire. Desert ceanothus seeds germinate prolifically following fire and may experience a sharp population increase. This plant community phase is ‘at risk’ of invasion by non-native annuals. Invasion of non-natives will cause this plant community to cross a biotic threshold (T1a) into state 2.

Community 1.3
Plant Community 1.3

This plant community is characterized by the encroachment of pinyon and juniper trees. Exclusion of fire can lead to invasion of pinyon and juniper into mountain big sagebrush communities. Mountain big sagebrush can serve as a nurse plant for tree seedlings. This plant community is identified as ‘at risk’, total tree cover is near 20 percent and without fire or other disturbance this community phase will cross an irreversible threshold (T1b) into state 3. Management options to keep this plant community from crossing a threshold include cutting trees and decreasing dominance by woody perennials.

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Tree	314	448	594
Shrub/Vine	275	342	448
Grass/Grasslike	78	118	168
Forb	62	101	135
Total	**729**	**1009**	**1345**

Pathway 1.1a
Community 1.1 to 1.2

Wildfire, insect/disease attack or prolonged drought.

Pathway 1.1b
Community 1.1 to 1.3

Absence of disturbance.

Pathway 1.2a
Community 1.2 to 1.1

Absence of disturbance and natural regeneration over time. Complete recovery of sagebrush communities may take greater than 20 years.

Pathway 1.3a
Community 1.3 to 1.2

Absence from disturbance and natural regeneration over time.

State 2
Invaded State

This state is characterized by the presence of non-native species in the understory. Introduced annuals such as cheatgrass have invaded the plant community. A biotic threshold is crossed with the introduction of non-native annuals that are difficult to remove from the system and have the potential to significantly alter disturbance regimes from their historic range of variation. These non-native annuals are highly flammable and can promote wildfire where fires historically have been infrequent. Recovery of sagebrush to pre-fire conditions is dependent on available seed source and favorable weather conditions and may take an extended period of time.

Community 2.1
Plant Community 2.1

This plant community is compositionally similar to the reference plant community, with a trace of non-natives in the understory. Ecological function has not changed as this time. However, the presence of non-natives has reduced the ecological resilience of the site and it will respond differently following a disturbance. Management focused on reducing anthropogenic impacts is important for maintaining the health of this mountain big sagebrush community phase.

Community 2.2
Plant Communtity 2.2

This plant community is characteristic of a post-disturbance, early seral, plant community. Early successional plant communities in the invaded state may or may not be dominated by non-native annuals. Sprouting shrub species quickly recover and provide favorable sites for shrub seedling establishment. Fast moving, low intensity fires result in the incomplete removal of sagebrush, allowing for direct reestablishment. Remnant patches of mature sagebrush will result in a faster recovery. Needleandthread grass may temporally decrease following wildfire. Desert ceanothus seeds germinate prolifically following fire and may experience a sharp population increase. The abundance on non-native biomass depends on weather conditions, drought may favor native perennials and decrease abundance of non-natives.

Community 2.3
Plant Community 2.3

This plant community is characterized by the encroachment of pinyon and juniper trees with non-natives in the understory. Exclusion of fire can lead to invasion of pinyon and juniper into mountain big sagebrush communities. Mountain big sagebrush can serve as a nurse plant for tree seedlings. This plant community is identified as ‘at risk’, total tree cover is near 20 percent and without fire or other disturbance this community phase will cross an irreversible threshold (T2) into state 3. Management options to keep this plant community from crossing a threshold include cutting trees and decreasing dominance by woody perennials.

Pathway 2.1a
Community 2.1 to 2.2

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

Pathway 2.1b
Community 2.1 to 2.3

Absence of disturbance and natural regeneration over time.

Pathway 2.2a
Community 2.2 to 2.1

Natural regeneration over time and absence from disturbance. Complete recovery of sagebrush communities may take greater than 20 years.

Pathway 2.3a
Community 2.3 to 2.2

Wildfire, insect/disease attack or prolonged drought.

State 3
Tree State

This state is characterized by the invasion of pinyon and juniper and tree cover of greater than 20 percent. Lack of fire, insect/disease attack and drought allows seedlings and saplings to infill and eventually dominate the plant community, changing the ecological dynamics of the site. Non-native annuals may or may not be present in the understory. This state experiences reduced infiltration and increased runoff during precipitation events, diminishing soil moisture. Feedbacks contributing to the stability of this state include reduced understory vegetation resulting from decreased soil moisture and overstory shading.

Community 3.1
Plant Community 3.1

This plant community is characterized by an immature forest, trees dominate the visual aspect of the plant community. Understory is moderately influenced by overstory shading, duff accumulation and competition, shrubs and native grasses are decreasing. Non-natives may or may not be present in the understory. Mountain big sagebrush is shade intolerant and declines rapidly with increased canopy cover. Tree canopy is greater than 20 percent.

Community 3.2
Plant Community 3.2

This plant community is dominated by grasses and forbs under full sunlight. Standing snags remaining after disturbance have little to no effect on composition or production of herbaceous vegetation. Sprouting shrubs and those that readily establish from seed are the first to appear and provide favorable microsites for the establishment of mountain big sagebrush. Long-lived perennials including sagebrush will colonize the site, given protection from large scale disturbance and abusive land use practices. Increased availability of critical resources following wildfire or other disturbance may result in increase non-native biomass, if present in the plant community.

Community 3.3
Plant Community 3.3

This plant community is characterized by trees that have reached or are near the maximal height for the site. Without disturbance, the trees on this site become very old. Remaining understory vegetation is severely reduced or even absent due to overstory shading, competition and duff accumulation. Dead shrubs are common in the understory, perennial grasses and forbs are mostly absent. Surface erosion is common and bare ground is dominant. Non-native species may or may not be present in the understory. Tree canopy ranges from 30 to >50 percent.

Pathway 3.1b
Community 3.1 to 3.2

Wildfire, insect/disease attack or prolonged drought.

Pathway 3.1a
Community 3.1 to 3.3

Absence of disturbance and natural regeneration over time.

Pathway 3.2a
Community 3.2 to 3.1

Absence of disturbance and natural regeneration over time.

Pathway 3.3a
Community 3.3 to 3.2

Wildfire, insect/disease attack or prolonged drought.

Transition T1a
State 1 to 2

Introduction of non-native species due to a combination of factors including: 1) surface disturbance, 2) changes in the kinds of animals and their grazing patterns, 3) drought and/or 4) changes in fire history.

Transition T1b
State 1 to 3

Continued lack of disturbance. Encroachment and establishment of pinyon and juniper. Tree canopy is greater than 20 percent and bare ground is increasing.

Transition T2
State 2 to 3

Continued lack of disturbance. Encroachment and establishment of pinyon and juniper. Tree canopy is greater than 20 percent and bare ground is increasing.

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Primary Perennial Grasses**			135–359	
	needle and thread	HECO26	*Hesperostipa comata*	45–135	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	45–135	–
	blue grama	BOGR2	*Bouteloua gracilis*	45–90	–
2	**Secondary Perennial Grasses**			1–45	
	squirreltail	ELEL5	*Elymus elymoides*	4–27	–
	Sandberg bluegrass	POSE	*Poa secunda*	4–27	–
Forb					
3	**Perennial Forbs**			18–45	
	Torrey's milkvetch	ASCA9	*Astragalus calycosus*	4–18	–
	leastdaisy	CHAET2	*Chaetopappa*	4–18	–
	bird's-beak	CORDY	*Cordylanthus*	4–18	–
	spurge	EUPHO	*Euphorbia*	4–18	–
	desert frasera	FRAL5	*Frasera albomarginata*	4–18	–
	hoary tansyaster	MACA2	*Machaeranthera canescens*	4–18	–
	longleaf phlox	PHLO2	*Phlox longifolia*	4–18	–
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	4–18	–
Shrub/Vine					
4	**Primary Shrubs**			448–538	
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	448–538	–
5	**Secondary Shrubs**			45–135	
	fourwing saltbush	ATCA2	*Atriplex canescens*	4–18	–
	desert ceanothus	CEGR	*Ceanothus greggii*	4–18	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	4–18	–
	mormon tea	EPVI	*Ephedra viridis*	4–18	–
	slender buckwheat	ERMI4	*Eriogonum microthecum*	4–18	–
	sulphur-flower buckwheat	ERUM	*Eriogonum umbellatum*	4–18	–
	Stansbury cliffrose	PUST	*Purshia stansburiana*	4–18	–
	Joshua tree	YUBR	*Yucca brevifolia*	4–18	–
	grizzlybear pricklypear	OPPOE	*Opuntia polyacantha var. erinacea*	1–4	–

Table 8. Community 1.3 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Primary Perennial Grasses**			73–135	
	blue grama	BOGR2	*Bouteloua gracilis*	20–50	–
	needle and thread	HECO26	*Hesperostipa comata*	20–50	–
2	**Secondary Perennial Grass**			20–50	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	4–20	–
	squirreltail	ELEL5	*Elymus elymoides*	4–20	–
	Sandberg bluegrass	POSE	*Poa secunda*	4–20	–
Forb					
3	**Primary Forbs**			22–101	
	milkvetch	ASTRA	*Astragalus*	4–16	–
	Indian paintbrush	CASTI2	*Castilleja*	4–16	–
	Cooper's rubberweed	HYCO2	*Hymenoxys cooperi*	4–16	–
	hoary tansyaster	MACA2	*Machaeranthera canescens*	4–16	–
	firecracker penstemon	PEEA	*Penstemon eatonii*	4–16	–
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	4–16	–
Shrub/Vine					
4	**Primary Shrubs**			202–381	
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	151–252	–
5	**Secondary Shrubs**			50–151	
	fourwing saltbush	ATCA2	*Atriplex canescens*	4–20	–
	desert ceanothus	CEGR	*Ceanothus greggii*	4–20	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	4–20	–
	mormon tea	EPVI	*Ephedra viridis*	4–20	–
	slender buckwheat	ERMI4	*Eriogonum microthecum*	4–20	–
	sulphur-flower buckwheat	ERUM	*Eriogonum umbellatum*	4–20	–
	grizzlybear pricklypear	OPPOE	*Opuntia polyacantha var. erinacea*	4–20	–
	Stansbury cliffrose	PUST	*Purshia stansburiana*	4–20	–
	Joshua tree	YUBR	*Yucca brevifolia*	4–20	–
Tree					
6	**Evergeen Trees**			392–605	
	Utah juniper	JUOS	*Juniperus osteosperma*	202–303	–
	singleleaf pinyon	PIMO	*Pinus monophylla*	202–303	–

Animal community

Livestock Interpretations:
This site is suitable for livestock grazing. Grazing management should be keyed to dominant grasses and palatable shrub production. 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. Needleandthread provides highly palatable forage, especially in the spring before fruits have developed. Needlegrasses are grazed in the fall only if the fruits are softened by rain. Indian ricegrass is highly palatable to all classes of livestock in both green and cured condition. It

supplies a source of green feed before most other native grasses have produced much new growth. Blue grama is valuable forage for all classes of domestic livestock, providing excellent forage for cattle and sheep. Blue grama tends to be most productive following summer rains, but it cures well and provides forage year round.
Stocking rates vary over time depending upon season of use, climate variations, site, kinds and class of grazing animals, and previous and current management goals. A safe starting stocking rate is an estimated stocking rate that is fine tuned by the client by adaptive management through the year and from year to year. Actual use records for individual sites, a determination of the degree to which the sites have been grazed, and an evaluation of trend in the site condition offer the most reliable basis for developing initial stocking rates.
Wildlife Interpretations:
This elevational zone is home to many wildlife species, including various species of bats, cottontail rabbits, ground squirrels and coyotes. Mountain big sagebrush is highly preferred and nutritious winter forage for mule deer and elk. Additional shrubs species provide some degree of browsing resource but are present in limited quantities. Shrubs provide valuable cover for birds and small mammals throughout the year. Needleandthread is moderately important spring forage for mule deer, but use declines considerably as more preferred forages become available. Indian ricegrass is eaten by pronghorn in moderate amounts whenever available. A number of heteromyid rodents inhabiting desert rangelands show preference for seed of Indian ricegrass. Indian ricegrass is an important component of jackrabbit diets in spring and summer. Indian ricegrass seed provides food for many species of birds. Doves, for example, eat large amounts of shattered Indian ricegrass seed lying on the ground. Blue grama also provides important forage for mule deer. Quail and some songbirds eat the seeds of blue grama. Small mammals also eat blue grama seeds and stems. Flower heads and seeds of blue grama are also consumed by grasshoppers, which can all but eliminate an annual seed crop.

Hydrological functions

The soils associated with this site are characterized by low runoff and moderate permeability.

Recreational uses

Aesthetic value is derived from the diverse floral and faunal composition and the colorful flowering of wild flowers and shrubs during the spring and early summer. This site offers rewarding opportunities to photographers and for nature study. This site is used for camping and hiking and has potential for upland and big game hunting.

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. Indian ricegrass was traditionally eaten by some Native Americans. The Paiutes used the seed as a reserve food source.

Other information

Needleandthread is useful for stabilizing eroded or degraded sites. Because of its wide adaptation, ease of establishment, and economic value, blue grama is used extensively for conservation purposes, rangeland seeding, and landscaping. Blue grama is useful for reclamation and for erosion control in arid and semiarid regions.

Type locality

Location 1: Clark County, NV	
Township/Range/Section	T16S R61E S12
UTM zone	N
UTM northing	4046703
UTM easting	670124
Latitude	36° 33′ 2″
Longitude	115° 5′ 57″

General legal description	SE1/4 sec12, T.16S, R.61E; Approximately 13 kilometers north and 23 kilometers east of Corn Creek, at the north end of Peekaboo Canyon; approximately 10 kilometers south-southwest of Wamp Spring; USGS Hayford Peak SE, NV 7.5 minute topographic quadrangle.

Other references

Chen, J. and J.M. Stark. 2000. Plant species effect and carbon and nitrogen cycling in sagebrush-crested wheatgrass soil. Soil Biology and Biochemistry. 32:47-57.

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Noy-Meir, I. 1973. Desert Ecosystem: Environmental and Producers. Annual Review of Ecology and Systematics. 4:25-51.

USDA-NRCS. 2011. Big Sagebrush Plant Guide. Available on line < http://plants.usda.gov/plantguide/pdf/pg_artrv.pdf>

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Contributors

PN-E

Approval

Sarah Quistberg, 2/25/2025

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)	Patti Novak-Echenique
Contact for lead author	State Rangeland Management Specialist
Date	06/30/2011
Approved by	Sarah Quistberg
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills are none to rare.

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2. **Presence of water flow patterns:** Water flow patterns are none to rare.

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3. **Number and height of erosional pedestals or terracettes:** Pedestals are none to rare. Occurrence is usually limited to areas of water flow patterns.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground 10-20% depending on amount of surface rock fragments.

5. **Number of gullies and erosion associated with gullies:** None.

6. **Extent of wind scoured, blowouts and/or depositional areas:** None.

7. **Amount of litter movement (describe size and distance expected to travel):** Fine litter (foliage from grasses and annual & perennial forbs) expected to move distance of slope length (<10 ft) during intense summer convection storms or rapid snowmelt events. Persistent litter (large woody material) will remain in place except during catastrophic events.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** stability values should be 3 to 6 on most soil textures found on this site. (To be field tested.)

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** A horizon thickness 0-3 inches. Surface structure is typically strong, thick platy. Soil surface colors are brown and soils are typified by an ochric epipedon. Organic matter of the surface 2 to 3 inches is typically 1 to 1.5 percent dropping off quickly below. Organic matter content can be more or less depending on micro-topography.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Perennial herbaceous plants (especially deep-rooted bunchgrasses [i.e., Indian ricegrass & needleandthread] slow runoff and increase infiltration. Shrub canopy and associated bunchgrasses break raindrop impact and provide opportunity for snow catch and accumulation on site.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** Compacted layers are none. Platy or massive sub-surface horizons or subsoil argillic horizons are not to be interpreted as compacted layers.

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: Reference Plant Community: Mountain big sagebrush >> deep-rooted, cool season, perennial bunchgrasses >associated shrubs > warm-season bunchgrasses > shallow-rooted, cool season, perennial bunchgrasses > deep-rooted, cool season, perennial forbs=fibrous, shallow-rooted, cool season, perennial and annual forbs.

    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):** Dead branches within individual shrubs common and standing dead shrub canopy material may be as much as 25% of total woody canopy; some of the mature bunchgrasses (<20%) have dead centers.

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14. **Average percent litter cover (%) and depth (in):** Mostly concentrated under shrubs; total cover under and between plants: 20-30% and depth of litter is <½ inch.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season (end of May) ± 800 lbs/ac.

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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:** Potential invaders on this site include cheatgrass, singleleaf pinyon and Utah juniper.

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17. **Perennial plant reproductive capability:** All functional groups should reproduce in average (or normal) and above average growing season years. Less reproduction on below-average precipitation years.
