USDA Natural Resources
Conservation Service

Ecological site R030XC034NV
SHALLOW GRAVELLY LOAM 9-11 P.Z.

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General information

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

Ecological site concept

This site occurs on fan remnants with slopes from 4 to 30 percent. Elevations range from 4800 to 7500 feet. Depth to the calcic horizon ranges from 18 to 43 centimeters. Depth to the petrocalcic horizon is 43 to 75 centimeters.

This is a group concept and provisional STM that also covers the following ecological sites: R030XC007NV, R030XB142NV, R030XC018NV, R030XC024NV, R030XC037NV, R030XC232CA.

Associated sites

R030XC033NV	**SANDY LOAM 9-11 P.Z.**
R030XC038NV	**SHALLOW GRAVELLY SLOPE 9-11 P.Z.**

Similar sites

R030XC037NV	**SHALLOW LOAM 9-11 P.Z.** ATCA2 important shrub; more productive.
R030XC040NV	**STEEP NORTH SLOPE 9-11 P.Z.** ACHNA dominant grasses; less productive.
R030XC007NV	**SHALLOW GRAVELLY LOAM 7-9 P.Z.** No BOGR2, PUST important species.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Coleogyne ramosissima*
Herbaceous	(1) *Hesperostipa comata* (2) *Achnatherum hymenoides*

Physiographic features

This site occurs on fan remnants with slopes from 4 to 30 percent. Elevations range from 4800 to 7500 feet.

Table 2. Representative physiographic features

Landforms	(1) Fan remnant
Flooding frequency	None
Ponding frequency	None
Elevation	1,463–2,286 m

Slope	4–15%

Climatic features

The climate is semiarid with cool, moist winters and warm, intermittently moist summers. Precipitation is greatest in the winter with lesser secondary peak in summer, typical of the Mojave Desert transition to the Great Basin. Average annual precipitation is 9 to 11 inches. Mean annual air temperature is 51 to 56 degrees F. The average growing season is about 130 to 180 days.

Table 3. Representative climatic features

Frost-free period (average)	180 days
Freeze-free period (average)	
Precipitation total (average)	279 mm

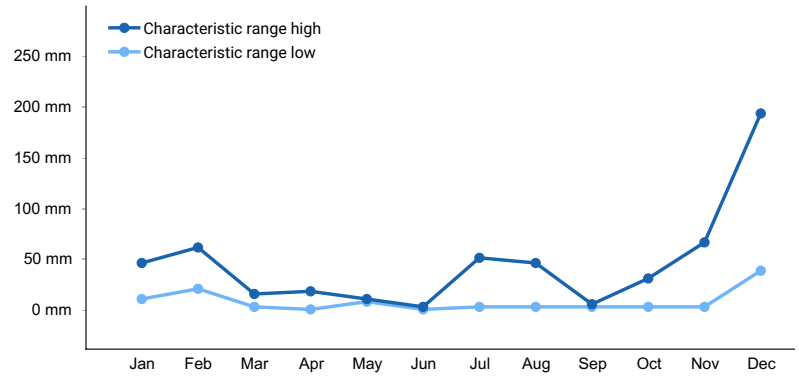


Figure 1. Monthly precipitation range

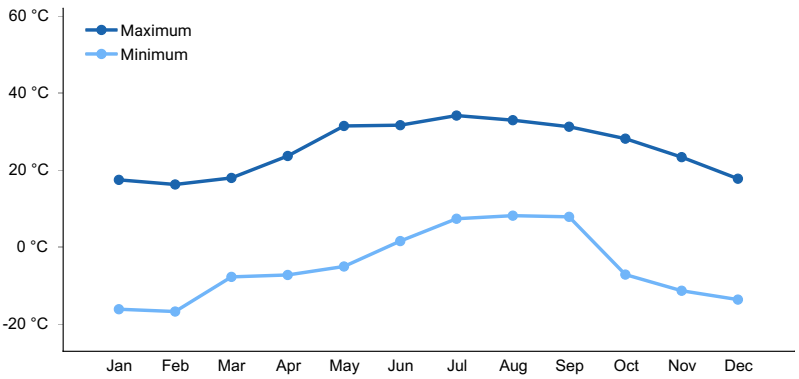


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site are shallow and well drained. They formed in alluvium derived from limestone parent material. Soils are characterized by very high runoff, moderately high saturated hydraulic conductivity above the petrocalcic horizon and very low in the lower part of the petrocalcic. Depth to the calcic horizon ranges from 18 to 43 centimeters. Depth to the petrocalcic horizon is 43 to 75 centimeters. Total surface rock fragments range from 60 to 80 percent. Surface rock fragments help to protect the soil surface from wind and water erosion. Soil series correlated to this ecological site include Wamp, a loamy-skeletal, carbonatic, mesic, shallow, Calcic Petrocalcids.

Table 4. Representative soil features

Parent material	(1) Alluvium–limestone
Surface texture	(1) Very gravelly loam (2) Very gravelly fine sandy loam (3) Gravelly loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately rapid
Soil depth	43–76 cm
Surface fragment cover <=3"	60–80%
Surface fragment cover >3"	4–10%
Available water capacity (0-101.6cm)	1.24–2.69 cm
Calcium carbonate equivalent (0-101.6cm)	20–50%
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)	8.2–8.4
Subsurface fragment volume <=3" (Depth not specified)	35–60%
Subsurface fragment volume >3" (Depth not specified)	0–7%

Ecological dynamics

Blackbrush communities are most prevalent in the transitional zone between the Mojave Desert and Great Basin. Blackbrush is a paleoendemic species as originally postulated by Stebbins and Major (1965). Blackbrush is a transitional species that occupies a boundary that has shifted in recent geologic time. Analysis of packrat middens suggests a 50–100-m downward movement of the blackbrush zone along elevational gradients in the Mojave Desert (Cole and Webb, 1985; Hunter and McAuliffe, 1994).

Blackbrush is long-lived and generally considered a climax species. It is a non-sprouter; regeneration depends on wind pollinated seed and heavy winter precipitation, and is therefore slow to re-colonize burned areas (Anderson 2001). Blackbrush recruitment is episodic, like many shrubs in arid systems, when conditions are favorable large seed crops are produced and the rest of the time is characterized by minimal seed output (Pendleton and Meyer 2004). Blackbrush seeds are frequently cached away by rodents, until conditions are conducive for germination. Typically, germination occurs during the winter and early spring, given the proper moisture conditions and cool soil temperatures (Pendleton 2008). Seeds require cold stratification before germination and the survival of seedlings following germination is dependent on the availability of spring time moisture (Pendleton 2008).

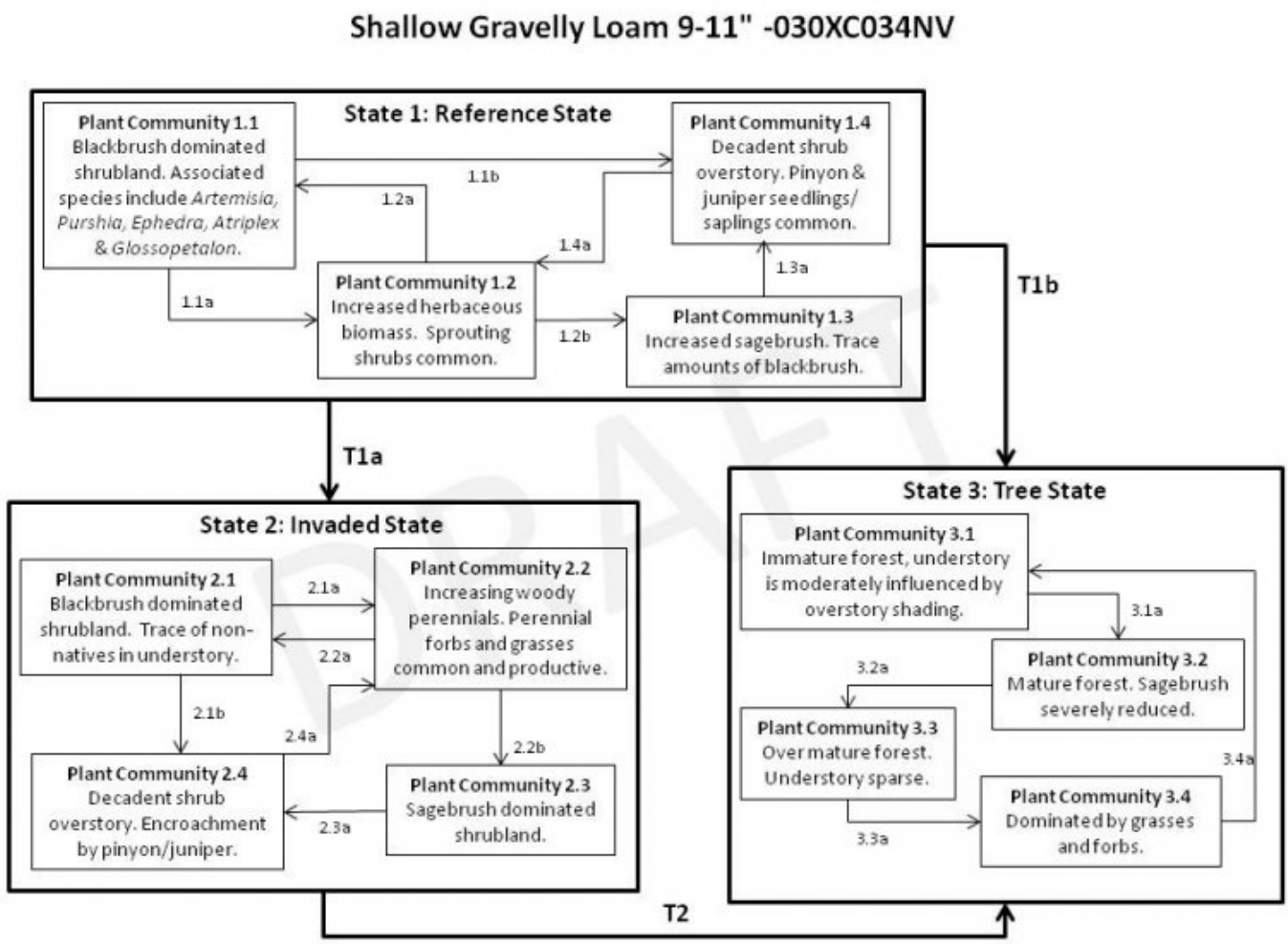
On undisturbed sites, blackbrush dominates the landscape and species diversity is generally low. Undisturbed blackbrush communities are fairly resistant to invasion by non-natives (Brooks and Matchett 2003). Mature blackbrush plants are well adapted to persist under less than optimal conditions, and individuals' may live as long as 400 years (Pendleton and Meyer 2004).

Fire Ecology:

Blackbrush stands are considered to be one of the most flammable native plant assemblages in the Mojave Desert. Fire will start and spread easily due to the close spacing nature and resinous foliage of blackbrush. During periods with high winds, low relative humidity and low fuel moisture blackbrush will experience stand replacing fires. The short-lived seed of blackbrush is readily destroyed by fire and it may take upwards of 60 years for blackbrush to achieve pre-fire conditions. There is frequently 100 percent mortality of mature blackbrush following fire (Brooks and Matchett 2003). Mountain big sagebrush is readily killed by wildfire and establishes soley from seed. Sagebrush is characterized by a pulse recruitment pattern durring periods of favorable climate. Ephedra generally sprouts after

fire damages aboveground vegetation and may increase in cover and density post-fire. Needleandthread is top killed by fire and sprouts from the surviving root crown. 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 is tolerant of fire when dormant, but can be killed if burned during active growing season. It frequently increases in cover and production following fire.
Post-fire plant communities vary, depending on use history and species present prior to the fire. Post fire sprouting shrub species such as yucca, Apache plume and ephedra increase along with perennial grasses. Species that readily reestablish from seed such as snakeweed also increase. Generally, non-natives increase and native species decrease post fire (Brooks and Matchett 2003). The effects of fire on blackbrush appear to be long term, it is killed by fire and is slow to reestablish. Blackbrush communities are also susceptible to replacement by mountain big sagebrush.

State and transition model



State 1
Reference State

The reference state is representative of the natural range for variability under pristine conditions. This site is dominated by an evergreen shrub community. Community phase changes are primarily driven by long-term drought and infrequent wildfire. Historically, blackbrush associations were long-lived stable communities. Fire was infrequent and patchy due to low fuel loading. Reproduction and recruitment are episodic, based on favorable environmental conditions (Pendleton and Meyer 2004). Very old stands of blackbrush may have established hundreds to thousands of years ago under very different climatic conditions and will take a considerable amount of time to recover following disturbances.

Community 1.1
Reference Plant Community

Figure 3. Shallow Gravelly Loam

The reference plant community is dominated by blackbrush, needleandthread, and Indian ricegrass. Mountain big sagebrush is another important species associated with this site. Potential vegetative composition is about 20 percent grasses, 10 percent forbs and 70 percent shrubs and trees. Approximate ground cover (basal and crown) is about 25 to 40 percent. This plant community phase can persist under undisturbed conditions for an extended period of time.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	273	389	544
Grass/Grasslike	78	112	157
Forb	39	56	78
Tree	1	3	6
Total	**391**	**560**	**785**

Community 1.2
Plant Community 1.2

Figure 5. burned

This plant community is characteristic of an early-seral, post-disturbance plant community and is initially heavily dominated by herbaceous vegetation. Sprouting shrubs quickly return and provide favorable environment for the establishment of other shrub seedlings. Fast-moving, low intensity fires result in the incomplete removal of blackbrush allowing for direct reestablishment through on site seed. This plant community is ‘at-risk’ of invasion by non-native annuals, like red brome, cheatgrass and red stem filaree. Invasion of non-natives will cause this plant community to cross a biotic threshold into state 2. Composition of post-fire plant communities may vary depending on season of burn. Summer fires commonly result in reduced cover of needleandthread and blue grama, while mesa dropseed increases in cover.

Community 1.3
Plant Community 1.3

Figure 6. mountain big sagebrush community phase

This plant community is characterized by dominance of mountain big sagebrush. Natural succession post fire may

result in dominance by big sagebrush, blackbrush is present in trace amounts. Blackbrush establishes solely from seed and is characterized by pulse recruitment pattern dependant on ideal climatic conditions. This ecological site is near the elevational limit for blackbrush communities, sagebrush readily establishes in this zone and is capable of replacing blackbrush if climatic patterns are conducive.

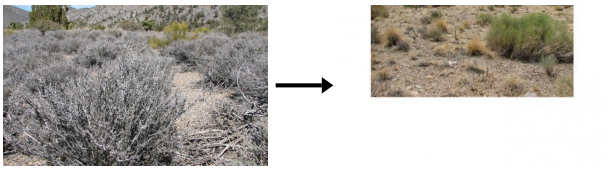
Community 1.4
Plant Community 1.4

This plant community is characterized by encroachment of pinyon and juniper and loss of other structural and functional groups. This community phase is identified as ‘at-risk’, total tree cover is near 20 percent and without fire or other disturbance tree cover will increase. The at-risk community phase is in danger of crossing an irreversible biotic threshold to state 3. Management options to keep this community phase from crossing a threshold include cutting trees and reducing dominance by woody vegetation and encouraging herbaceous vegetation to return balance of structural and functional groups.

Table 6. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	269	448	594
Tree	146	336	560
Grass/Grasslike	27	45	62
Forb	7	11	17
Total	**449**	**840**	**1233**

Pathway 1.1a
Community 1.1 to 1.2



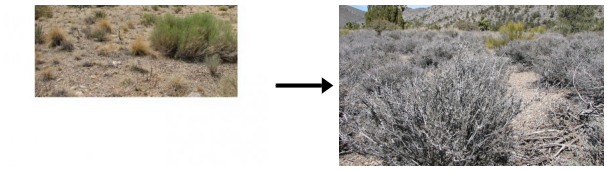
Reference Plant Community **Plant Community 1.2**

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

Pathway 1.1b
Community 1.1 to 1.4

Natural regeneration over time and encroachment of pinyon and juniper trees. This ecological site is at higher risk of pinyon-juniper invasion when it is located near a woodland. Invasion may occur with out previous disturbance.

Pathway 1.2a
Community 1.2 to 1.1



Plant Community 1.2 **Reference Plant Community**

Absence from disturbance and natural regeneration over time. Regeneration of blackbrush is dependent on nearby seed source and favorable climatic conditions. Recovery of blackbrush to pre-fire conditions can take greater than 60 years.

Pathway 1.2b
Community 1.2 to 1.3

Plant Community 1.2 Plant Community 1.3

Natural regeneration post-wildfire may result in sagebrush dominance.

Pathway 1.3a
Community 1.3 to 1.4

Absence of fire and other natural disturbance. Without fire, shrubs become over mature and decadent. Lack of disturbance allows tree seedlings to encroach.

Pathway 1.4a
Community 1.4 to 1.2

Wildfire, disease/insect attack or prolonged drought removes shrub cover, tree seedlings and saplings and encourages growth of perennial bunchgrasses. Non-natives may increase post fire.

State 2
Invaded State

The invaded state is characterized by the presence of non-native annuals. A biotic threshold is crossed, with the introduction of non-natives that are difficult to remove from the system and have the potential to alter disturbance regimes significantly from their natural range of variability. Introduced annuals such as red brome, cheatgrass and redstem filaree have invaded the reference plant community. These non-natives annuals are highly flammable and promote wildfires where fires historically have been infrequent. Following a disturbance this state relies on the availability of a nearby seed source.

Community 2.1
Plant Community 2.1

This plant community is compositionally similar to the reference plant community with the presence of non-natives in the understory. Ecological processes have not been compromised at this time, however the ecological resilience of the site is reduced by the presence of non-natives. This plant community is respond differently following a disturbance when compared to the reference plant community. Management focused on reducing anthropogenic impacts is important for maintaining the health of perennial native species and protecting the site from further degradation.

Community 2.2
Plant Community 2.2

This plant community is characteristic of a post-disturbance plant community. Initially post-fire plant communities are heavily dominated by herbaceous vegetation. Shrubs capable of sprouting and those that readily establish from seed quickly return. Sprouting species are the first to achieve dominance, including Ephedra, Yucca and Purshia. Species that readily establish from seed such as Atriplex and Gutierrizea are also common. Fast-moving, low-intensity fires result in the incomplete removal of blackbrush allowing for direct reestablishment. Blackbrush and sagebrush reestablish provided favorable climatic conditions and available seed source. Abundance of non-native biomass varies annual depending on weather. Droughty conditions can favor native perennials and decrease abundance of non-natives. Post-fire plant communities vary in response to the season of burn. Summer fires result in decreased cover of needleandthread and blue grama, while mesa dropseed increases in cover and production.

Table 7. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Grass/Grasslike	202	336	471
Shrub/Vine	84	140	196
Forb	50	84	118
Total	**336**	**560**	**785**

Community 2.3
Plant Communtiy 2.3

This plant community is characterized by dominance of mountain big sagebrush. Natural succession post fire may result in dominance by big sagebrush, blackbrush is present in trace amounts. Blackbrush establishes solely from seed and is characterized by a pulse recruitment pattern dependent on ideal climatic conditions. This ecological site is near the elevational limit for blackbrush communities, sagebrush readily establishes in this zone and is capable of replacing blackbrush if climatic patterns are conducive. Non-native species remain in plant community.

Community 2.4
Plant Community 2.4

This plant community is characterized by encroachment of pinyon and juniper trees. Total tree cover is near 20% and seedlings and saplings are prevalent in the plant community. This community phase is identified as ‘at-risk’, without fire or other disturbance, tree cover will increase. The at-risk community phase is in danger of crossing an irreversible biotic threshold to state 3. Management options to keep this community phase from crossing a threshold include cutting trees and reducing dominance by woody vegetation and encouraging growth of perennial bunchgrasses.

Pathway 2.1a
Community 2.1 to 2.2

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

Pathway 2.1b
Community 2.1 to 2.4

Natural regeneration over time and absence from disturbance allows trees to encroach.

Pathway 2.2a
Community 2.2 to 2.1

Absence from disturbance and natural regeneration over time. Regeneration of black brush is dependent on nearby seed source and favorable climatic conditions. Recovery of blackbrush to pre-fire conditions can take greater than 60 years.

Pathway 2.2b
Community 2.2 to 2.3

Changes in climatic patterns allow mountain big sagebrush to replace blackbrush as the dominant species.

Pathway 2.3a
Community 2.3 to 2.4

Absence of fire and other natural disturbance. Without fire, shrubs become over mature and decadent. Lack of disturbance allows tree seedlings to encroach into the plant community.

Pathway 2.4a
Community 2.4 to 2.2

Wildfire, prolonged drought and/or insect/disease attack removes decadent shrub cover, tree seedlings and saplings. Non-natives may increase post fire.

State 3
Tree State

The tree state is characterized by the invasion of pinyon-juniper and tree cover greater than 20 percent. Lack of fire and other disturbance allows seedlings and saplings to infill and eventually dominate, 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. An abiotic threshold has been crossed changing the ecological dynamics of the site.

Community 3.1
Plant Community 3.1

Figure 9. Burned - tree invasion

This plant community is characterized by an immature forest, trees constitute more than half of the plant community. Understory vegetation is moderately affected by overstory shading. Shrubs and grasses are decreasing. Non-natives may or may not be present in understory. Tree canopy is greater than 20 percent.

Community 3.2
Plant Community 3.2

This plant community is characterized by pinyon and juniper trees that have reached or are near maximal height for the site. Remaining understory vegetation is strongly influenced by overstory shading, competition and duff accumulation. Dead shrubs are common in understory, perennial grasses and forbs are mostly absent. Non-native species may or may not be present. Tree canopy ranges from 30-50 percent.

Community 3.3
Plant Communtiy 3.3

This plant community is characterized by an over mature forest. Upper crowns of dominant trees are normally flat topped or rounded. Without disturbance, the trees on this site become very old. Understory herbaceous production is greatly reduced or even absent due to tree competition and overstory shading, tree canopy is generally greater than 50 percent. Surface erosion is common and bare ground is dominant. Non-natives are able to survive dense canopy cover, if present in plant community.

Community 3.4
Plant Community 3.4

This community phase is characteristic of an early-seral, post-disturbance plant community and is initially dominated by herbaceous vegetation. Standing snags remaining after disturbance have little to no effect on the composition and production of the herbaceous vegetation. Sprouting shrubs and those that readily establish from seed are the first to appear. Long lived perennials and late successional species will colonize the site, given protection from large scale disturbance or abusive management. Increased availability of critical resources following wildfire may result in increased non-native biomass.

Pathway 3.1a
Community 3.1 to 3.2

Absence of disturbance and continued infilling by pinyon and juniper. Bare ground increasing.

Pathway 3.2a
Community 3.2 to 3.3

Continued infilling by pinyon-juniper trees leading to a closed canopy.

Pathway 3.3a
Community 3.3 to 3.4

Wildfire, disease/insect attack or prolonged drought removes tree canopy.

Pathway 3.4a
Community 3.4 to 3.1

Absence from disturbance and natural regeneration over time. Seedling and saplings begin to encroach from neighboring sites.

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 20 percent or greater 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 20 percent or greater and bare ground is increasing.

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Primmary Perennial Grasses**			67–140	

	needle and thread	HECO26	*Hesperostipa comata*	28–56	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	28–56	–
	blue grama	BOGR2	*Bouteloua gracilis*	11–28	–
2	**Secondary Perennial Grasses**			1–28	
	Mormon needlegrass	ACAR14	*Achnatherum aridum*	3–17	–
	desert needlegrass	ACSP12	*Achnatherum speciosum*	3–17	–
	squirreltail	ELEL5	*Elymus elymoides*	3–17	–
	mesa dropseed	SPFL2	*Sporobolus flexuosus*	3–17	–
3	**Annual Grasses**			1–11	
	sixweeks fescue	VUOC	*Vulpia octoflora*	1–11	–
Forb					
4	**Perennial Forbs**			11–56	
	Mojave sandwort	ARMA3	*Arenaria macradenia*	3–11	–
	castilla	CASTI	*Castilla*	3–11	–
	Cooper's rubberweed	HYCO2	*Hymenoxys cooperi*	3–11	–
	hoary tansyaster	MACA2	*Machaeranthera canescens*	3–11	–
5	**Annual Forbs**			1–28	
	cryptantha	CRYPT	*Cryptantha*	1–11	–
	gilia	GILIA	*Gilia*	1–11	–
	manybristle chinchweed	PEPA2	*Pectis papposa*	1–11	–
	phacelia	PHACE	*Phacelia*	1–11	–
Shrub/Vine					
6	**Primary Shrubs**			280–392	
	blackbrush	CORA	*Coleogyne ramosissima*	224–280	–
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	28–84	–
7	**Secondary Shrubs**			28–112	
	black sagebrush	ARNO4	*Artemisia nova*	3–17	–
	fourwing saltbush	ATCA2	*Atriplex canescens*	3–17	–
	desert ceanothus	CEGR	*Ceanothus greggii*	3–17	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	3–17	–
	Nevada jointfir	EPNE	*Ephedra nevadensis*	3–17	–
	mormon tea	EPVI	*Ephedra viridis*	3–17	–
	Apache plume	FAPA	*Fallugia paradoxa*	3–17	–
	spiny greasebush	GLSP	*Glossopetalon spinescens*	3–17	–
	threadleaf snakeweed	GUMI	*Gutierrezia microcephala*	3–17	–
	Fremont's mahonia	MAFR3	*Mahonia fremontii*	3–17	–
	Stansbury cliffrose	PUST	*Purshia stansburiana*	3–17	–
	banana yucca	YUBA	*Yucca baccata*	3–17	–
	Joshua tree	YUBR	*Yucca brevifolia*	3–17	–
	beavertail pricklypear	OPBA2	*Opuntia basilaris*	1–8	–
	grizzlybear pricklypear	OPPOE	*Opuntia polyacantha var. erinacea*	1–8	–
	spinystar	ESVI2	*Escobaria vivipara*	1–8	–

	Whipple cholla	CYWH	*Cylindropuntia whipplei*	1–8	–
Tree					
8	**Trees**			1–6	
	singleleaf pinyon	PIMO	*Pinus monophylla*	1–3	–
	Utah juniper	JUOS	*Juniperus osteosperma*	1–2	–

Table 9. Community 1.4 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Perennial Grasses**			27–62	
	squirreltail	ELEL5	*Elymus elymoides*	6–17	–
	needle and thread	HECO26	*Hesperostipa comata*	3–11	–
	mesa dropseed	SPFL2	*Sporobolus flexuosus*	3–11	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	6–11	–
	desert needlegrass	ACSP12	*Achnatherum speciosum*	3–11	–
	blue grama	BOGR2	*Bouteloua gracilis*	6–11	–
Forb					
2	**Perennial Forbs**			7–17	
	rockcress	ARABI2	*Arabis*	1–11	–
	castilla	CASTI	*Castilla*	1–11	–
	desert frasera	FRAL5	*Frasera albomarginata*	1–11	–
	Cooper's rubberweed	HYCOC	*Hymenoxys cooperi var. canescens*	1–11	–
	hoary tansyaster	MACA2	*Machaeranthera canescens*	1–11	–
	beardtongue	PENST	*Penstemon*	1–11	–
3	**Annual Forbs**			1–17	
	cryptantha	CRYPT	*Cryptantha*	1–11	–
	gilia	GILIA	*Gilia*	1–11	–
Shrub/Vine					
4	**Primary Shrubs**			112–448	
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	112–224	–
	blackbrush	CORA	*Coleogyne ramosissima*	112–224	–
5	**Secondary Shrubs**			28–112	
	fourwing saltbush	ATCA2	*Atriplex canescens*	6–28	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	6–28	–
	Nevada jointfir	EPNE	*Ephedra nevadensis*	6–28	–
	mormon tea	EPVI	*Ephedra viridis*	6–28	–
	Fremont's mahonia	MAFR3	*Mahonia fremontii*	6–28	–
	banana yucca	YUBA	*Yucca baccata*	6–28	–
	Joshua tree	YUBR	*Yucca brevifolia*	6–28	–
	beavertail pricklypear	OPBA2	*Opuntia basilaris*	1–6	–
	grizzlybear pricklypear	OPPOE	*Opuntia polyacantha var. erinacea*	1–6	–
	Whipple cholla	CYWH	*Cylindropuntia whipplei*	1–6	–
Tree					
6	**Evergreen**			112–560	
	Utah juniper	JUOS	*Juniperus osteosperma*	56–224	–
	singleleaf pinyon	PIMO	*Pinus monophylla*	56–224	–

Table 10. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Primary Perennial Grasses**			112–392	
	mesa dropseed	SPFL2	*Sporobolus flexuosus*	56–168	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	56–140	–
2	**Secondary Perennial Grasses**			28–56	
	needle and thread	HECO26	*Hesperostipa comata*	6–28	–
	desert needlegrass	ACSP12	*Achnatherum speciosum*	1–17	–
	King's eyelashgrass	BLKI	*Blepharidachne kingii*	1–17	–
	blue grama	BOGR2	*Bouteloua gracilis*	1–17	–
3	**Annual Non-native Grasses**			1–28	
	red brome	BRRU2	*Bromus rubens*	1–17	–
Forb					
4	**Perennial Forbs**			11–56	
	Cooper's rubberweed	HYCOC	*Hymenoxys cooperi var. canescens*	1–17	–
	hoary tansyaster	MACA2	*Machaeranthera canescens*	1–17	–
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	1–17	–
	small wirelettuce	STEXE	*Stephanomeria exigua ssp. exigua*	1–17	–
5	**Annual Forbs**			1–28	
	cryptantha	CRYPT	*Cryptantha*	1–17	–
	phacelia	PHACE	*Phacelia*	1–17	–
Shrub/Vine					
6	**Primary Shrubs**			73–168	
	fourwing saltbush	ATCA2	*Atriplex canescens*	28–56	–
	banana yucca	YUBA	*Yucca baccata*	28–56	–
	rubber rabbitbrush	ERNA10	*Ericameria nauseosa*	11–28	–
7	**Secondary Shrubs**			28–84	
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	1–17	–
	blackbrush	CORA	*Coleogyne ramosissima*	1–17	–
	button brittlebush	ENFR	*Encelia frutescens*	1–17	–
	Apache plume	FAPA	*Fallugia paradoxa*	1–17	–
	threadleaf snakeweed	GUMI	*Gutierrezia microcephala*	1–17	–
	Joshua tree	YUBR	*Yucca brevifolia*	1–17	–
	Whipple cholla	CYWH	*Cylindropuntia whipplei*	1–6	–

Animal community

Livestock Interpretations:
This site is suitable for livestock grazing. Grazing management should be keyed to dominant grasses and palatable shrub production. Blackbrush is not preferred as forage by domestic livestock, but does provide some forage during the spring, summer and fall. 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, 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.

Wildlife Interpretations:
Blackbrush is a valuable browse species for bighorn sheep. It may also comprise up to 25% of the mule deer winter diet. Blackbrush provides cover for upland game birds, nongame birds and small mammals. Mountain big sagebrush is highly preferred and nutritious winter forage for mule deer. 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

Soils associated with this site are characterized by very high runoff and moderately rapid 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

Blackbrush contributes to desert fertility by 1) protecting the soil against wind erosion through retarding the movement of soil and increasing the accumulation of fine soil particles around its base; 2) protecting understory vegetation from the effects of high temperatures, thereby helping to retain surface nitrogen and adding organic matter to the soil; and 3) serving as a nitrogen reservoir through the storage of nitrogen in roots, leaves, and stems. 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	T13S R61E S29
UTM zone	N
UTM northing	4071507
UTM easting	663676
Latitude	36° 46′ 30″

Longitude	115° 9′ 57″
General legal description	Occurs on Mule Deer Ridge, approximately 2 miles from Dead Horse Trail, between the East Desert Range and the Sheep Range, west of U.S. Highway 93. Section 29, T13S. R61E. MDBM. USGS Mule Deer Ridge. NV 7.5 minute series quadrangle.

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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	06/28/2011
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. A few rills (<1/10 m or 30 ft) will occur, especially following summer convective storms due to very shallow skeletal soils and steep slopes.

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2. **Presence of water flow patterns:** A few (<1/10 m or 30 ft) water flow patterns may occur in interspaces between

shrubs, rarely connected. These should be limited to times following intense summer storms on steeper slopes or to natural drainages within the ecological site.

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3. **Number and height of erosional pedestals or terracettes:** Few to none. Should only occur when associated with rills or water flow patterns on steeper slopes or natural drainages. Height < 0.5 inch.

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare Ground <10%. Soil is mostly covered by gravels, vegetation and some lichens/mosses. When patches of bare ground (3 ft. diameter) occur, they should be associated with rodent burrow activity.

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

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

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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 intense summer storms.

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil stability values range from 1 to 3 in the interspaces and 4 to 6 under canopy.

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

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Deep-rooted bunchgrasses and shrub canopy break raindrop impact, slow runoff, increase infiltration and provide some opportunity for snow catch on this site.

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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):** Compacted layers are none. Subsoil calcic horizons are not to be interpreted as compacted.

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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: non-sprouting evergreen shrubs

Sub-dominant: deep-rooted, cool-season, perennial bunchgrasses = deciduous shrubs > shallow-rooted cool-season perennial bunchgrasses > deep-rooted, cool-season perennial forbs <> annual forbs <> succulents

Other: Other: warm-season, perennial grasses, biological soil crust

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 30% of total woody canopy; some of the mature bunchgrasses (<20%) have dead centers, especially with multi-year droughts.

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14. **Average percent litter cover (%) and depth (in):** Litter cover is concentrated under shrubs and grasses and totals 25-35%. Litter depth is <0.25 inches.

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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 (through mid-June) is ± 500 lbs/ac, ranging from 350 in poor growth years to 700 lbs/ac in optimal growth years.

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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:** Red brome and cheatgrass can invade and persist on this site. Utah juniper will increase.

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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, although, rarely none, will occur in below-average precipitation years.
