USDA Natural Resources
Conservation Service

Ecological site R030XC046NV
LOAMY SLOPE 9-11 PZ

Last updated: 2/25/2025
Accessed: 05/11/2025

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 north-facing mountain sideslopes. Slopes range from 30 to 75 percent, but slope gradients from 30 to 50 percent are most typical. Elevations range from 5500 to 7200 feet. The soils associated with this site are shallow, well drained soils that formed in residuum and colluvium derived from limestone.

This site is part of group concept R030XC040NV.

Associated sites

R030XC045NV	**SHALLOW NORTH SLOPE 9-11 P.Z.**

Similar sites

R030XC035NV	**LOAMY 9-11 P.Z.** HECO26 co-dominant grass, occurs on inset fans, more productive.

Table 1. Dominant plant species

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

Physiographic features

This site occurs on north-facing mountain sideslopes. Slopes range from 30 to 75 percent, but slope gradients from 30 to 50 percent are most typical. Elevations range from 5500 to 7200 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountain slope
Elevation	5,500–7,200 ft
Slope	30–75%
Aspect	N

Climatic features

The climate is subhumid with cold, 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 45 to 50 degrees F. The average growing season is about 90 to 150 days.

Table 3. Representative climatic features

Frost-free period (average)	150 days
Freeze-free period (average)	
Precipitation total (average)	11 in

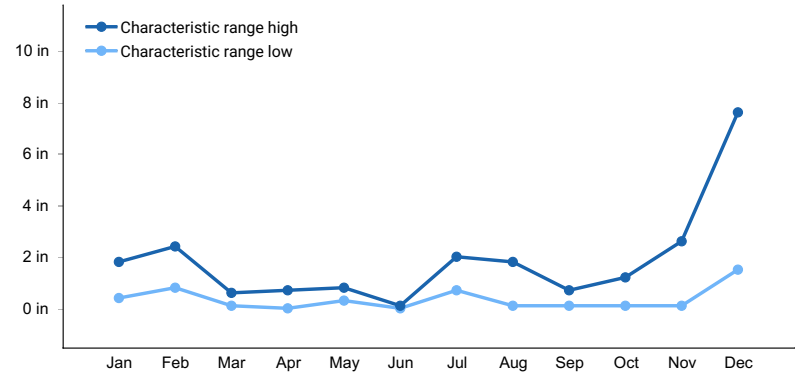


Figure 1. Monthly precipitation range

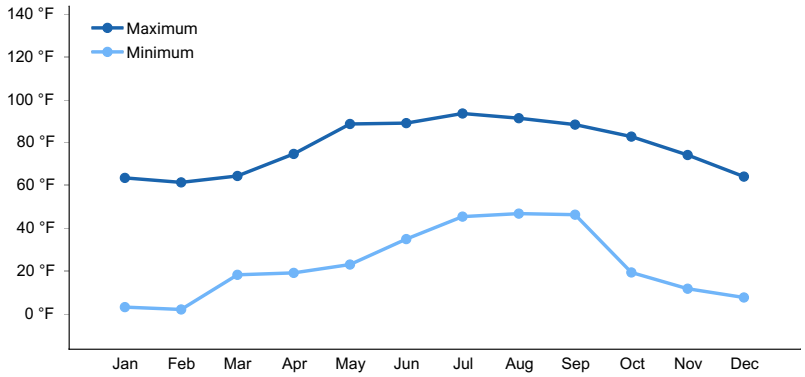


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site are shallow, well drained soils that formed in residuum and colluvium derived from limestone. The soil profile is modified with high amounts of rock fragments and is characterized by a mollic epipedon from 0 to 18 inches. The available water holding capacity is very low and runoff is very high. The soil moisture regime is aridic bordering on ustic. Soil series associated with this site include Mormonwell, a loamy-skeletal, carbonatic, mesic, Aridic Lithic Haplustolls.

Table 4. Representative soil features

Parent material	(1) Colluvium–limestone (2) Residuum–limestone
Surface texture	(1) Extremely gravelly loam (2) Extremely gravelly fine sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained

Permeability class	Moderately rapid
Soil depth	10–20 in
Surface fragment cover <=3"	50–65%
Surface fragment cover >3"	4–5%
Available water capacity (0-40in)	0.72–1.59 in
Calcium carbonate equivalent (0-40in)	40–60%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–5
Soil reaction (1:1 water) (0-40in)	7.8–8
Subsurface fragment volume <=3" (Depth not specified)	50–70%
Subsurface fragment volume >3" (Depth not specified)	0–8%

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 in relatively high elevation 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. 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 condition for several years following germination.

Sagebrush species 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.

The accumulation and decomposition of litter increase nutrient concentrations under big sagebrush shrub canopies. Carbon and nitrogen concentration 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.

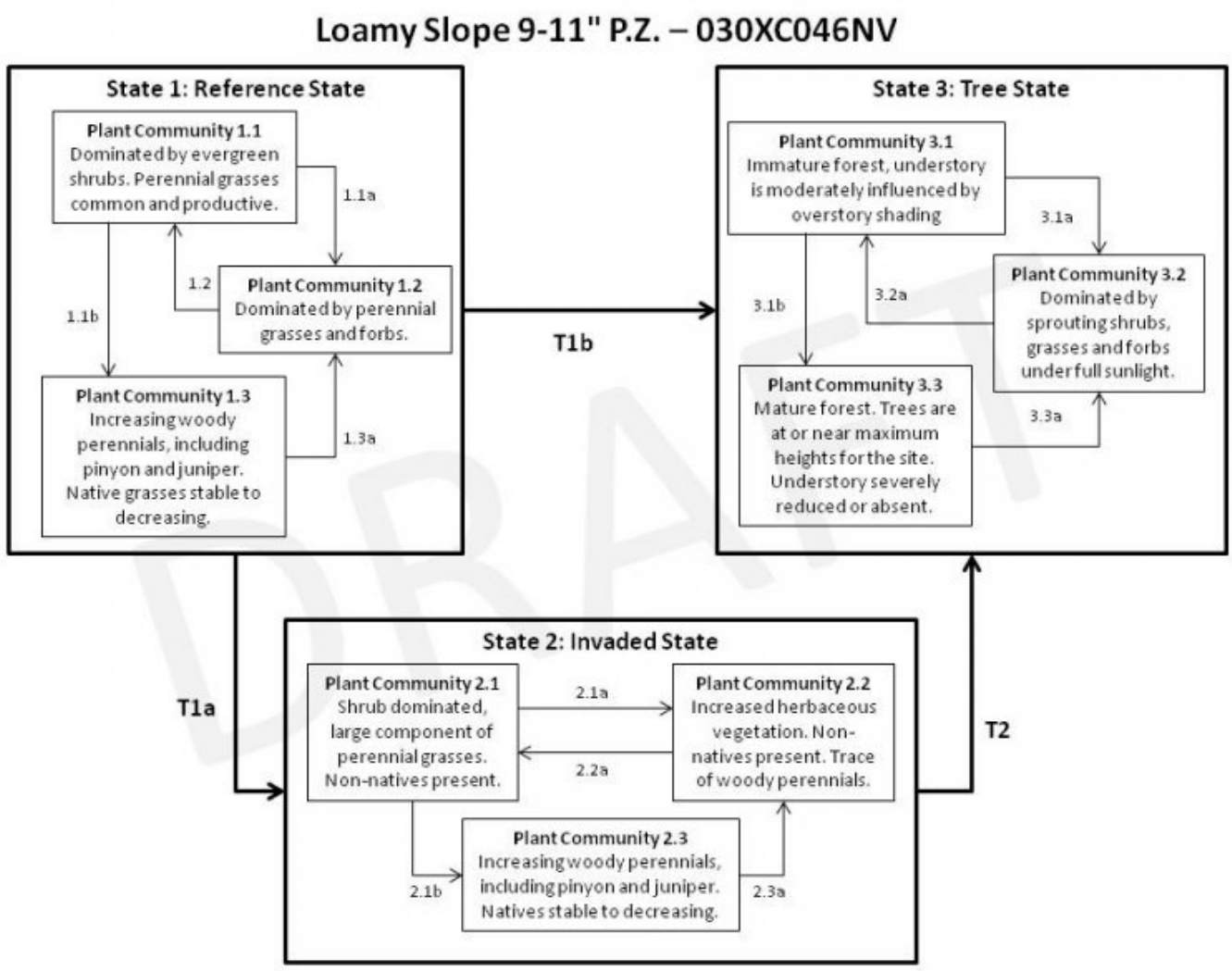
Fire Ecology:

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 and the conversion to woodland. However, drastically shorter fire return intervals will result in loss of shrub community and an increase in annual biomass. Species likely to invade this site include cheatgrass and red brome.

Pre-settlement fire return intervals in mountain big sagebrush communities varied from 20 to >50 years. Mountain big sagebrush is highly susceptible to injury from fire. It is often top-killed by fire and will not resprout. Green ephdra and sprouts from the root crown and generally increase post-fire. Stansbury cliffrose is a weak sprouter and may decrease following fire. 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. Post-fire regeneration of squirreltail occurs from surviving root crowns and from nearby seed source.

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

The reference plant community is dominated by a mountain big sagebrush and is characteristic of a mid-seral, healthy condition. Important associated species include Indian ricegrass, blue grama and ephedra. Potential vegetative composition is about 60 percent shrubs, 30 percent perennial native grasses and 10 percent forbs. Approximate ground cover (basal and foliar) is 20 to 35 percent.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	175	243	345
Grass/Grasslike	50	70	100
Forb	25	35	50
Tree	0	2	5
Total	**250**	**350**	**500**

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 (spiny greasebush, banana yucca) quickly recover following disturbance and provide favorable conditions for establishment of other shrub seedlings, such as mountain big sagebrush. This plant community phase is ‘at risk’ of invasion by non-native annuals. Non-natives may take advantage of the increased availability of critical resources following wildfire or other disturbance.

Community 1.3
Plant Community 1.3

Figure 4. Invaded plant community

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% and without fire or other disturbance this community phase will cross an irreversible threshold (T1) into state 2. Management options to keep this plant community from crossing a threshold include cutting trees and decreasing dominance by woody perennials.

Pathway 1.1a
Community 1.1 to 1.2

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

Pathway 1.1b
Community 1.1 to 1.3

Absence from disturbance, alteration of natural fire regime, and encroachment of pinyon and juniper.

Pathway 1.2a

Community 1.2 to 1.1

Absence from disturbance and natural regeneration over time. Recovery of sagebrush communities to pre-disturbance conditions may take a significant amount of time (>25 years).

Pathway 1.3a
Community 1.3 to 1.2

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

State 2
Invaded State

This state is characterized by the presence of non-native species in the understory. 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.

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. This plant community phase will 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 sagebrush communities.

Community 2.2
Plant Community 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 site 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. Indian ricegrass is killed by fire, but readily establishes through seed. Green ephedra sprouts vigorously following fire and commonly increases in cover. Stansbury cliffrose is a weak sprouter and initially decreases following wildfire. 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. 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.

Pathway 2.3a
Community 2.3 to 2.1

2.3a: 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. 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, shrubs and native grasses are decreasing. Mountain big sagebrush is shade intolerant and declines rapidly with increased canopy cover. Tree canopy is greater than 20 percent. Infiltration is reduced and runoff is increased, contributing to increased bare ground.

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 effects on composition or production of herbaceous vegetation. Sprouting shrubs (spiny greasebush, banana yucca) and those that readily establish from seed are the first to appear. Long-lived perennials including sagebrush will colonized the site, given protection from large scale disturbance and abusive land use practices. This plant community phase is ‘at risk’ of invasion by non-natives. Non-native species may take advantage of the increase availability of critical resources following wildfire or other disturbance

Community 3.3
Plant Community 3.3

Figure 5. Tree state

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. Tree canopy ranges from 30 to >50 percent.

Pathway 3.1a
Community 3.1 to 3.2

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

Pathway 3.1b
Community 3.1 to 3.3

Absence of disturbance and natural regeneration over time.

Pathway 3.2a
Community 3.2 to 3.1

Absence from disturbance and natural regeneration over time.

Pathway 3.3a
Community 3.3 to 3.2

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

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 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Grass/Grasslike					
1	**Primary Perennial Grasses**			43–124	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	18–53	–
	blue grama	BOGR2	*Bouteloua gracilis*	18–53	–
	squirreltail	ELEL5	*Elymus elymoides*	7–18	–

2	**Secondary Perennial Grasses**			1–18	
	Mormon needlegrass	ACAR14	*Achnatherum aridum*	2–7	–
	muttongrass	POFE	*Poa fendleriana*	2–7	–
	Sandberg bluegrass	POSE	*Poa secunda*	2–7	–
Forb					
3	**Perennial Forbs**			18–35	
	Indian paintbrush	CASTI2	*Castilleja*	2–7	–
	buckwheat	ERIOG	*Eriogonum*	2–7	–
	Cooper's rubberweed	HYCO2	*Hymenoxys cooperi*	2–7	–
	hoary tansyaster	MACAC	*Machaeranthera canescens ssp. canescens*	2–7	–
	desert globemallow	SPAM2	*Sphaeralcea ambigua*	2–7	–
4	**Secondary Forbs**			1–11	
	bird's-beak	CORDY	*Cordylanthus*	2–7	–
	cryptantha	CRYPT	*Cryptantha*	2–7	–
Shrub/Vine					
5	**Primary Shrubs**			154–211	
	mountain big sagebrush	ARTRV	*Artemisia tridentata ssp. vaseyana*	140–175	–
	mormon tea	EPVI	*Ephedra viridis*	7–18	–
	Stansbury cliffrose	PUST	*Purshia stansburiana*	7–18	–
6	**Secondary Shrubs**			7–53	
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	2–11	–
	slender buckwheat	ERMI4	*Eriogonum microthecum*	2–11	–
	sulphur-flower buckwheat	ERUM	*Eriogonum umbellatum*	2–11	–
	spiny greasebush	GLSP	*Glossopetalon spinescens*	2–11	–
	threadleaf snakeweed	GUMI	*Gutierrezia microcephala*	2–11	–
	desert almond	PRFA	*Prunus fasciculata*	2–11	–
	desert snowberry	SYLO	*Symphoricarpos longiflorus*	2–11	–
	banana yucca	YUBA	*Yucca baccata*	2–11	–
	grizzlybear pricklypear	OPPOE	*Opuntia polyacantha var. erinacea*	1–5	–
	Whipple cholla	CYWH	*Cylindropuntia whipplei*	1–5	–
	Mojave kingcup cactus	ECMO	*Echinocereus mojavensis*	1–5	–
Tree					
7	**Trees**			0–5	
	Utah juniper	JUOS	*Juniperus osteosperma*	0–4	–
	singleleaf pinyon	PIMO	*Pinus monophylla*	0–4	–

Animal community

Livestock Interpretations:
This site has limited value for livestock grazing, due to the low forage production and steep slopes. 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. Green ephedra is heavily browsed by livestock on winter range but only moderately or lightly

browsed during other seasons. Stansbury cliffrose is an important browse species for livestock, especially in the winter. 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. Bottlebrush squirreltail is very palatable winter forage for domestic sheep of Intermountain ranges. Domestic sheep relish the green foliage. Overall, bottlebrush squirreltail is considered moderately palatable to livestock.

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:
Mountain big sagebrush is highly preferred and nutritious winter forage for mule deer and elk. Green ephedra is an important browse species for big game animals. Green ephedra is heavily used by wildlife on winter ranges. Stansbury cliffrose is an important browse species for mule deer, pronghorn, game birds, and songbirds. Wild ungulates use it heavily in winter. 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. Bottlebrush squirreltail is a dietary component of several wildlife species.

Hydrological functions

Permeability is moderately rapid and runoff is very high. A few rills and water flow patterns may occur on steeper slopes. Deep-rooted perennial grasses and forbs slow runoff and increase infiltration. Shrub canopy and associated litter break raindrop impact and provide opportunity for snow catch and accumulation on site.

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 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. Triterpenoids extracted from Stansbury cliffrose have been shown to have inhibitory effects on HIV and Epstein-Barr virus. Native Americans used the inner bark for making clothing and ropes, and the branches for making arrows. Indian ricegrass was traditionally eaten by some Native Americans. The Paiutes used the seed as a reserve food source.

Other information

Green ephedra is listed as a successful shrub for restoring western rangeland communities and can be used to rehabilitate disturbed lands. It also has value for reducing soil erosion on both clay and sandy soils. Green ephedra establishes readily through direct seeding, transplants, and stem cuttings. Stansbury cliffrose is recommended for wildlife, roadside, construction, and mine spoils plantings; and for restoring pinyon-juniper woodland, mountain brushland, basin big sagebrush grassland, and black sagebrush communities. It can be established on disturbed seedbeds by broadcast seeding, drill seeding, or transplanting. Fall or winter seeding is recommended. 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. Bottlebrush squirreltail is tolerant of disturbance and is a suitable species for revegetation.

Type locality

Location 1: Clark County, NV	
Township/Range/Section	T15S R61E S12
UTM zone	N
UTM northing	4057581
UTM easting	670763
Latitude	36° 38′ 54″
Longitude	115° 5′ 22″
General legal description	Approximately 670 meters east and 500 meters north of Mormon Well, Desert National Wildlife Refuge. T15S, R61E, Section 12. USGS Mormon Well, 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.

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

Johnson, Kathleen A. 2000. Artemisia tridentata subsp. vaseyana. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2011, December 7].

Noy-Meir, I. 1973. Desert ecosystems: environment and producers. Annual Review of Ecology and Systematics 4: 25-51.

USDA-NRCS. 2011. Plant Guide: big sagebrush. Available on line (http://plants.usda.gov)

Contributors

E. Hourihan
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)	P.Novak-Echenique
Contact for lead author	State Rangeland Management Specialist
Date	08/15/2011
Approved by	Sarah Quistberg
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills are rare. A few can be expected on steeper slopes in areas subjected to summer convection storms or rapid spring snowmelt.

2. **Presence of water flow patterns:** Water flow patterns are rare but can be expected on steeper slopes in areas subjected to summer convection storms.

3. **Number and height of erosional pedestals or terracettes:** Pedestals are 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 5-10% 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 during intense summer convection storms or rapid snowmelt events. Persistent litter (large woody material) will remain in place except during large rainfall events.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil stability values should be 3 to 4 in interspaces and 5 to 6 under plants 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):** Surface structure is typically moderate medium, subangular blocky structure. Soil surface colors are dark brown and soils are typified by a mollic 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] slow runoff and increase infiltration. Shrub canopy and associated litter 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. Subsoil horizons with subangular blocky structure

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: Tall shrubs (mountain big sagebrush, cliffrose)>>

    Sub-dominant: deep-rooted, cool season, perennial bunchgrasses > associated shrubs > rhizomatous, warm season grasses > deep-rooted, perennial forbs > shallow-rooted cool season, perennial bunchgrasses > fibrous, shallow-rooted, annual and perennial forbs

    Other: succulents, evergreen trees

    Additional:

---

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 35% of total woody canopy; some of the mature bunchgrasses (<20%) have dead centers.

---

14. **Average percent litter cover (%) and depth (in):** Under canopy and between plant interspaces (30-50%) and litter depth is ± ¼-inch.

---

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season (through May) ± 350 lbs/ac; Favorable years 500 lbs/ac and unfavorable years 250 lbs/ac.

---

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 include cheatgrass and red brome. Pinyon and juniper will encroach in the absence of fire.

---

17. **Perennial plant reproductive capability:** All functional groups should reproduce in average (or normal) and above average growing season years. Some functional groups may not reproduce in unfavorable years.
