USDA Natural Resources Conservation Service

Ecological site R029XY173NV
SHALLOW GRAVELLY FAN 12-14 P.Z.

Last updated: 2/20/2025
Accessed: 05/13/2025

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.

MLRA notes

Major Land Resource Area (MLRA): 029X–Southern Nevada Basin and Range

The Southern Nevada Basin and Range MLRA (29) represents the transition from the Mojave Desert to the Great Basin. It is cooler and wetter than the Mojave. It is warmer and typically receives more summer precipitation than the Great Basin. This area is in Nevada (73 percent), California (25 percent), and Utah (2 percent). It makes up about 26,295 square miles (68,140 square kilometers). Numerous national forests occur in the area, including the San Bernardino, Angeles, Sequoia, Inyo, Humboldt-Toiyabe, and Dixie National Forests. Portions of Death Valley National Monument, the Nuclear Regulatory Commission's Nevada Test Site, the Hawthorne Ammunition Depot, and the Nellis Air Force Range in Nevada and the China Lake Naval Weapons Center in California also are in this MLRA. The northeast part of the Paiute Indian Reservation and the southern third of the Walker River Indian Reservation are in the part of this MLRA in Nevada, and the Lone Pine, Fort Independence, and Big Pine Indian Reservations are in the part in California.
Physiography:
The entire area is in the Great Basin Section of the Basin and Range Province of the Intermontane Plateaus. The area of broad, nearly level, aggraded desert basins and valleys between a series of mountain ranges trending north to south. The basins are bordered by sloping fans and pluvial lake terraces. The mountains are uplifted fault blocks with steep side slopes and not well dissected due to limited annual precipitation. Most of the valleys in this MLRA are closed basins or bolsons containing sinks or playa lakes.
Geology:
The mountains are dominated by Pliocene and Miocene andesite and basalt rocks, Paleozoic and Precambrian carbonate rocks prominent in some areas. Scattered outcrops of older Tertiary intrusives and very young tuffaceous sediments (Pliocene and Miocene) are in the western and eastern thirds of this MLRA. The valleys consist mostly of alluvial fill and playa deposits at the lowest elevations in the closed basins.
Climate:
The average annual precipitation is 3 to 12 inches (75 to 305 millimeters) in most of this area. It may be as high as 29 inches (735 millimeters), on the higher mountain slopes. Most of the rainfall occurs as high-intensity, convective thunderstorms during the growing season. Summers are dry, but sporadic storms are common in July and August.
Water Resources:
Water resources are scarce. Ground water and surface water sources are limited. Streams are small and intermittent. Quality of surface water in naturally degraded as streams cross area of valley fill effected by dissolved salts. Irrigation water may raise the levels of dissolved salts and suspended sediments causing contamination.
Soils:
Dominant soil orders include Entisols and Aridisols.

Classification relationships

US National Vegetation Classification (USNVC):3 Semi-Desert, 3.B Cool Semi-Desert Scrub and Grassland, 3.B.1 Cool Semi-Desert Scrub and Grassland, M170 Great Basin and Intermountain Dwarf Sage Shrubland and Steppe, G308 Intermountain Low and Black Sagebrush Shrubland and Steppe Group, CEGL002698 *Artemisia nova*/*Poa fendleriana* Shrubland.

Ecological site concept

The Shallow Gravelly Fan 12-14 P.Z. site is on erosional fan remnants. Slopes range from 4 to 30 percent, but slope gradients from 4 to 15 percent are most typical. Elevations range from 6,000 to 7,500 feet. The soils are shallow, well drained and formed in alluvium derived from limestone. The soil surface is covered with approximately 70 percent rock fragments, mostly gravels.

Associated sites

R029XY008NV	**SHALLOW CALCAREOUS LOAM 8-12 P.Z.** KRLA2, ATCA2 & ATCO associated shrubs, HECO26 important grass
R029XY081NV	**SHALLOW CALCAREOUS HILL 10-14 P.Z.** Desert needlegrass co-dominant, PIMO & JUOS important part of plant community

Similar sites

R029XY008NV	**SHALLOW CALCAREOUS LOAM 8-12 P.Z.** KRLA2, ATCA2 & ATCO associated shrubs, HECO26 important grass
R029XY045NV	**STONY CALCAREOUS SLOPE 8-12 P.Z.** On hills & low mountains, ACSP12 dominant grass
R029XY099NV	**STONY CALCAREOUS HILL** On hills, MAFR3 important shrub, ACHY & HECO26 dominate grass
R029XY014NV	**SHALLOW CALCAREOUS SLOPE 8-12 P.Z.** On hills & mountains, less productive, ACHY & HECO26 dominant grass
R029XY170NV	**SHALLOW CALCAREOUS LOAM 10-12** PERA4 important shrub, ACHY & HECO26 dominate grass

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia nova* (2) *Purshia stansburiana*
Herbaceous	(1) *Poa fendleriana* (2) *Achnatherum hymenoides*

Physiographic features

The Shallow Gravelly Fan 12-14 P.Z. site occurs on erosional fan remnants. Slopes range from 4 to 15 percent. Elevations range from 6,000 to 7,000 feet.

Table 2. Representative physiographic features

Landforms	(1) Fan remnant
Runoff class	Very high
Flooding frequency	None
Ponding frequency	None
Elevation	1,884–2,140 m
Slope	4–15%
Water table depth	183 cm
Aspect	Aspect is not a significant factor

Climatic features

The climate is semiarid with cool, moist winters and warm, intermittently moist, but usually dry summers. Average annual precipitation is 12 to 14 inches. The majority of precipitation comes as snow in the winter months, but intense convection storms may be common in the late summer. Mean annual air temperature is 45 to 50 degrees F. The average number of frost free days (where the air temperature does not fall below 32°F) per year ranges from 100 to 120.
Average monthly precipitation (inches) for Adaven, NV: Jan 1.39, Feb 1.48, March 1.38, April 1.07, May 0.78, June 0.53, July 1.00, Aug 1.19, Sept 0.65, Oct 1.18, Nov 0.88, Dec 1.23

There are no available climate stations.

Table 3. Representative climatic features

Frost-free period (average)	120 days
Freeze-free period (average)	180 days
Precipitation total (average)	356 mm

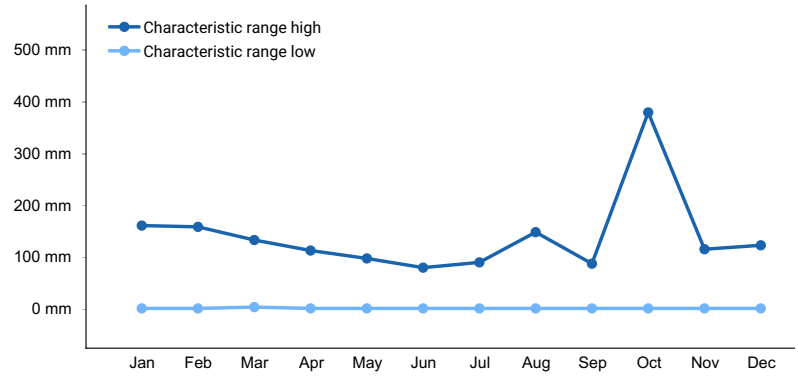


Figure 1. Monthly precipitation range

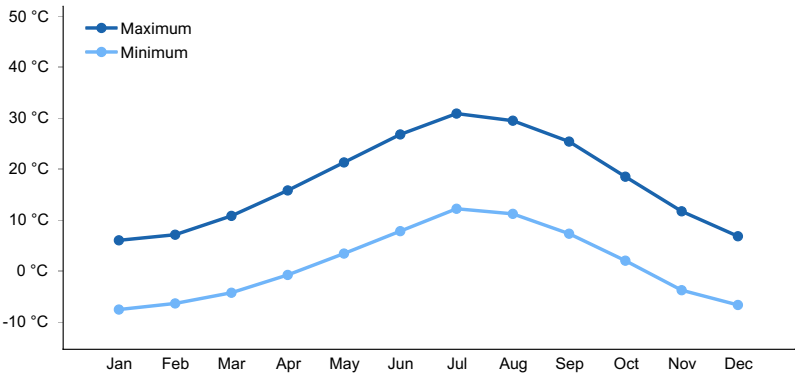


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils are shallow, well drained and formed in alluvium derived from limestone. The soil surface is covered with approximately 70 percent rock fragments, mostly gravels. Coarse fragments at the surface provide a stabilizing effect on surface erosion conditions. Soils are characterized by very high runoff, an ochric epipedon from 0 to 18 cm, a calcic horizon from 18 to 43 centimeters and a strongly cemented petrocalcic horizon from 43 to 75 centimeters. Soil reaction is moderately alkaline from the surface to the petrocalcic horizon. Soils are usually dry, but are moist in some part from December to March and intermittently moist for 10 to 20 days following summer convection storms. Soil moisture regime is aridic bordering on xeric. Soil series associated with this site include Ursine.

Table 4. Representative soil features

Parent material	(1) Alluvium–limestone
Surface texture	(1) Gravelly sandy loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately rapid
Soil depth	36–51 cm
Surface fragment cover <=3"	19%
Surface fragment cover >3"	2%
Available water capacity (Depth not specified)	3.56–4.83 cm
Calcium carbonate equivalent (0-101.6cm)	25–40%
Soil reaction (1:1 water) (0-101.6cm)	8.2–8.4
Subsurface fragment volume <=3" (Depth not specified)	34%
Subsurface fragment volume >3" (Depth not specified)	7%

Ecological dynamics

Communities of this ecological site are dynamic in response to changes in disturbance regimes and weather patterns. Primary natural disturbances affecting this site include periodic wildfire, disease, insect attack and drought. Plant community structure is controlled in part by infrequent wildfire and in part by pulses of seedling recruitment. Species growing on this site are adapted to receiving limited annual precipitation and typically do not experience drought related mortality. However, prolonged drought will result in reduced perennial herbaceous components and increased shrub dominance.

Black sagebrush (*Artemisia nova*) is an evergreen, aromatic shrub that is low-growing and decumbent. Black sagebrush is highly drought tolerant; it is more likely to endure drought than most sagebrush taxa. Black sagebrush occurs throughout the successional process, it is highly light tolerant and shade intolerant (Fryer, 2009). Mature plants are slightly salt tolerant and flood intolerant. The root system of black sagebrush maximizes water uptake with a deep taproot and shallow branching roots. Roots can be deep on favorable sites, but shallow soils prevent deep root development on most sites where black sagebrush is dominant. The combination of deep and shallow roots provides excellent soil stabilization. Black sagebrush tends to have a larger number of fibrous roots than big sagebrush species. The breakdown of aging roots also contributes to organic matter and nutrient cycling in the sagebrush system. Carbon and nitrogen concentration are higher under sagebrush canopies when compared to interspaces (Chen and Stark, 2000).

Black sagebrush flowers from midsummer to mid-fall across its range. Seeds have no morphological adaptations for dispersal and commonly fall close to the parent plant (Fryer, 2009). Seeds typically overwinter and germinate the spring after production. Seeds may germinate as early as April on some sites. Survival of sagebrush seedlings is dependent on adequate moisture conditions. Young plants are susceptible to less than desirable condition for several years following germination (Fryer, 2009). Ephemeral leaves are shed during summer drought, while persistent leaves remain on the branches through winter.

Muttongrass (*Poa fendleriana*) is a cool-season perennial bunchgrass with occasional short rhizomes and considered to be drought resistant (Howard, 1997). Muttongrass prefers open, dry conditions, but can tolerate partial shade. It can persist throughout the successional process (Howard, 1997). Muttongrass and other perennial bunchgrasses growing on this site improve ecological resistance and resilience by increasing infiltration, decreasing runoff and increasing soil organic matter.

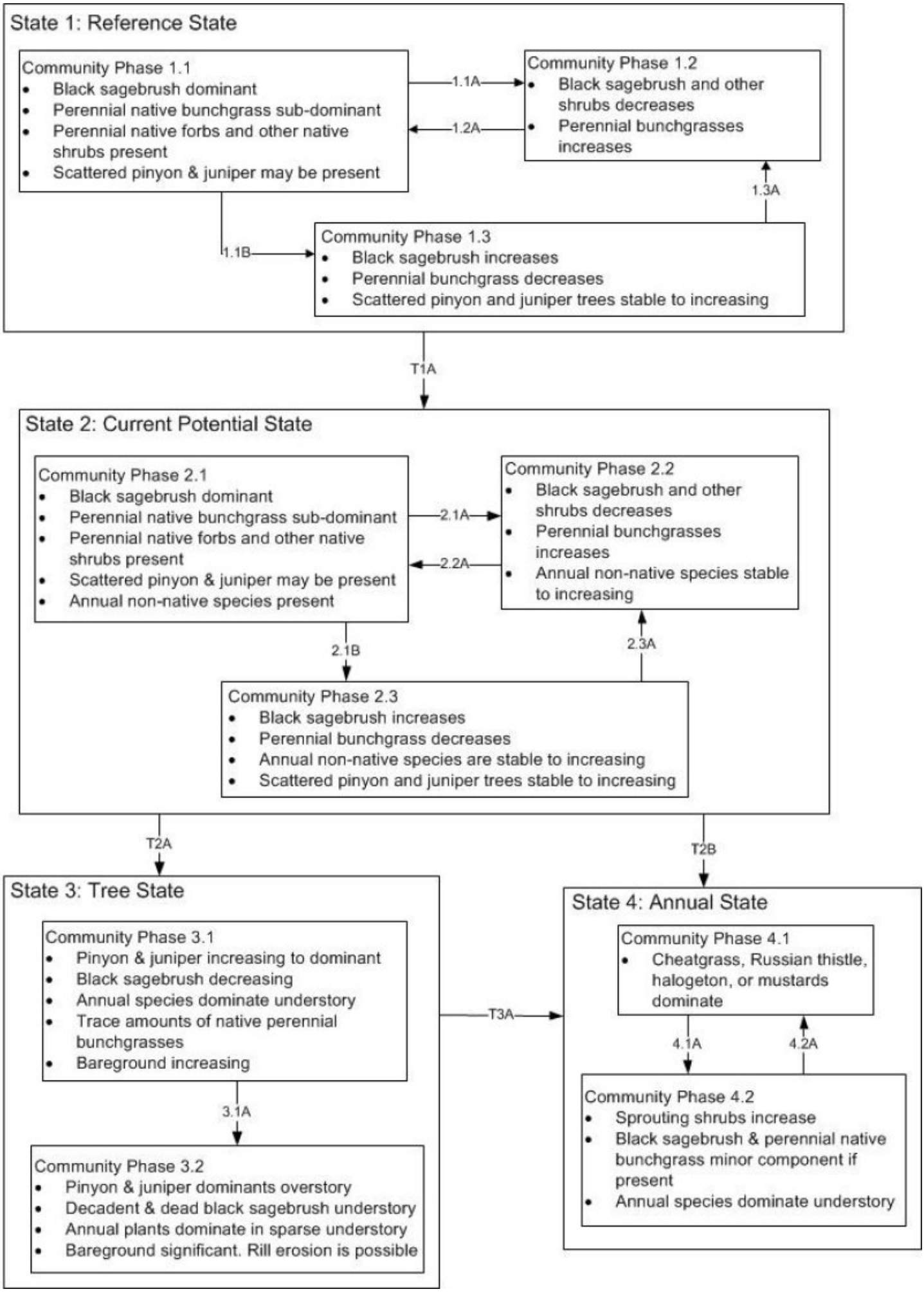
Sagebrush species are generally long-lived, therefore it is not necessary for new individuals to recruit every year for perpetuation of the stand. Infrequent large recruitment events and simultaneous low, continuous recruitment is the foundation of population maintenance (Noy-Meir, 1973). Mature properly 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 impacts ecosystem functioning and can result in soil loss. Improper grazing or recreation management can result in the reduction, or potential loss, of black sagebrush degrading ecosystem function.

Semiarid rangelands are characterized by spatially variable vegetative cover. Patches of vegetation or individual plants intercept runoff, increase infiltration and nutrient cycling, providing favorable sites for additional vegetation to establish. Infiltration of water in to the soil surface and possibly deeper into the soil profile, increases water stores. Water stored in the soil profile promotes biological activity by organisms, such as soil invertebrates, to form soil aggregate and macro-pores further enhancing infiltration (Ludwig et al., 2005). Interspaces or bare ground does not capture and store water in the same way as vegetated patches. Runoff is often discharged from the system and is therefore not available to plants. Runoff also redistributes soil and nutrients down slope. This results in less water and nutrients available for plant use, reducing plant production, vigor and seedling establishment.

Changes in species composition can occur in black sagebrush communities following repeated wildfire and abusive land management practices. Following wildfire, green ephedra (*Ephedra viridis*), Stansbury's cliffrose (*Purshia stansburiana*), and desert ceanthous (*Ceanothus greggii*) increase in canopy cover. Chronic excessive grazing by domestic livestock allows yellow rabbitbrush (*Chrysothamnus viscidiflorus*), Fremont’s mahonia (Mahonia fremonti), spiny greasebush (*Glossopetalon spinescens*) and black sagebrush to increase; while muttongrass, Indian ricegrass (*Achnatherum hymenoides*), and other perennial grasses and palatable shrubs decrease. Pinyon and juniper cover will increase on this site in the absence of natural occurring fire. Non-native species found on this site include cheatgrass (*Bromus tectorum*).

Fire Ecology:
There are limited records of historic fire frequencies or fire regimes for black sagebrush communities. Black sagebrush tends to occupy unproductive sites that have little fuel build-up, so they likely experienced extended fire return intervals. Black sagebrush plants are readily killed by all fire intensities. Following wildfire, black sagebrush is initially replaced by sprouting species. Reestablishment of sagebrush occurs through wind-dispersed seed sources. Black sagebrush requires 15 to 60 years post fire to regain dominance (Fryer, 2009). Therefore, frequent and repeated fires can easily eliminate it from a site. Modern invasion of non-native annual grasses provide a continuous fuel layer, changing the wildfire dynamics of this community.
Fire effects on Stansbury cliffrose are variable. Fire may kill or severely damage plants, at best it is a weak sprouter. Late-season fire increases the risk of mortality. Mojave ceanothus, spiny greasebush and green ephedra are favored by fire and may increase is cover following fire. Muttongrass is unharmed to slightly harmed by light-severity fall fires. It appears to be harmed by and slow to recover from severe fire. Indian ricegrass is killed by fire, but readily reestablishes on burned sites through seed.

State and transition model


State 1: Reference State
Community Phase 1.1
Black sagebrush dominant
Perennial native bunchgrass sub-dominant
Perennial native forbs and other native shrubs present
Scattered pinyon & juniper may be present
1.1A
1.2A
Community Phase 1.2
Black sagebrush and other shrubs decreases
Perennial bunchgrasses increases
1.3A
1.1B
Community Phase 1.3
Black sagebrush increases
Perennial bunchgrass decreases
Scattered pinyon and juniper trees stable to increasing
T1A
State 2: Current Potential State
Community Phase 2.1
Black sagebrush dominant
Perennial native bunchgrass sub-dominant
Perennial native forbs and other native shrubs present
Scattered pinyon & juniper may be present
Annual non-native species present
2.1A
2.2A
Community Phase 2.2
Black sagebrush and other shrubs decreases
Perennial bunchgrasses increases
Annual non-native species stable to increasing
2.1B
2.3A
Community Phase 2.3
Black sagebrush increases
Perennial bunchgrass decreases
Annual non-native species are stable to increasing
Scattered pinyon and juniper trees stable to increasing
T2A
T2B
State 3: Tree State
Community Phase 3.1
Pinyon & juniper increasing to dominant
Black sagebrush decreasing
Annual species dominate understory
Trace amounts of native perennial bunchgrasses
Bareground increasing
3.1A
Community Phase 3.2
Pinyon & juniper dominants overstory
Decadent & dead black sagebrush understory
Annual plants dominate in sparse understory
Bareground significant. Rill erosion is possible
T3A
State 4: Annual State
Community Phase 4.1
Cheatgrass, Russian thistle, halogeton, or mustards dominate
4.1A
4.2A
Community Phase 4.2
Sprouting shrubs increase
Black sagebrush & perennial native bunchgrass minor component if present
Annual species dominate understory

State 1: Representative of the reference conditions prior to Euro-American settlement in the west.
1.1A: fire or other disturbance that removes sagebrush canopy
1.1B: absence of disturbance and natural regeneration over time

1.2A: absence of disturbance and natural regeneration over time

1.3A: fire or other disturbance that removes sagebrush canopy

T1A: introduction of non-native species

State 2: Representative of the current potential with the presence of non-native annuals. Non-native annuals have the ability to significantly change disturbance regimes and nutrient cycling dynamics.
2.1A: fire or other disturbance that removes sagebrush canopy
2.1B: absence of disturbance and natural regeneration over time, may be coupled with inadequate rest and recovery from defoliation

2.2A: absence of disturbance and natural regeneration over time

2.3A: fire or other disturbance that removes sagebrush canopy

T2A: long term absence of fire and natural regeneration of pinyon & juniper trees
T2B: reoccurring severe fire

State 3: Dominated by pinyon and/or juniper trees. Changes in disturbance return intervals over the long term allows for pinyon and/or juniper to dominate the site by controlling site resources.
3.1A: absence of disturbance and natural regeneration over time

T3A: reoccurring severe fire

State 4: Dominated by non-native annuals. Changes in disturbance return intervals and nutrient dynamics creating a positive feedback loop.
4.1A: absence of disturbance and natural regeneration over time
4.2A: fire or other disturbance that removed shrub canopy

State 1
Reference State

The reference state is representative of the natural range of variability under naturally stable, pre-European settlement conditions. Vegetation is dominated by black sagebrush, Stansbury cliffrose, desert ceanothus and muttongrass with scattered perennial forbs. Primary natural disturbances affecting this ecological site include periodic wildfire, insect attack, disease and drought. Community phases are dynamic in response to changes in disturbance regimes and weather patterns.

Community 1.1
Reference community

The reference community is representative of this ecological site under naturally stable, pre-European settlement conditions. The reference plant community is dominated by black sagebrush and muttongrass. Desert ceanothus, Stansbury cliffrose and Indian ricegrass are other important species associated with this site. Annual and perennial forbs are present, but remain inconspicuous or dormant until adequate precipitation is available. Approximate ground cover (basal and foliar) is 20 to 30 percent. Potential vegetative composition is 25 percent grasses, 15 percent forbs, 60 percent shrubs and less than or equal to 1 percent trees.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	263	336	476
Grass/Grasslike	106	140	196
Forb	21	78	101
Tree	1	6	11
Total	**391**	**560**	**784**

Community 1.2
Bunchgrasses/shrubs

Black sagebrush and other shrubs decrease. Perennial bunchgrasses increase.

Community 1.3
Black sagebrush

Black sagebrush increases. Perennial bunchgrasses decrease. Scattered pinyon and juniper trees are present or increasing.

Pathway 1.1A
Community 1.1 to 1.2

Fire or other disturbance removes the sagebrush canopy.

Pathway 1.1B
Community 1.1 to 1.3

Absence of disturbance and natural regeneration of shrubs over time.

Pathway 1.2A
Community 1.2 to 1.1

Absence of disturbance and natural regeneration of shrubs over time.

Pathway 1.3A
Community 1.3 to 1.2

Fire or other disturbance that removes the sagebrush canopy.

State 2
Invaded State

The invaded state is characterized by the presence of non-native species. Compositionally, State 2 is similar to the reference state with a trace of non-native species in the understory. However, ecological resilience is reduced by the presence of non-natives, making it more difficult for this state to recover following disturbance. Low frequency, low intensity disturbances maintains the grass, shrub-grass and shrub community phases. However, non-natives

are favored if disturbance regimes vary from the range of historic variation. Black sagebrush is characterized by a pronounced delay in establishment following disturbance. Therefore, frequent, repeated fire fueled by non-native species can eliminate black sagebrush from a site.

Community 2.1
Black sagebrush/perennial bunchgrasses/non-native species

Black sagebrush is dominant. Perennial native bunchgrasses are sub-dominant. Perennial native forbs and other native shrubs are present. Pinyon and juniper trees are scattered, if present. Annual non-native species are present.

Community 2.2
Perennial bunchgrasses

Black sagebrush and other shrubs decrease. Perennial bunchgrasses increase. Annual non-native species are stable or increasing.

Community 2.3
Black Sagebrush

Black sagebrush increases. Perennial bunchgrasses decrease. Annual non-native species are stable or increasing. Pinyon and juniper trees are scattered and may be increasing.

Pathway 2.1A
Community 2.1 to 2.2

Fire or other disturbance removes the shrub canopy.

Pathway 2.1B
Community 2.1 to 2.3

Absence of disturbance and natural regeneration of shrubs over time. This may be coupled with inadequate rest of recovery from defoliation.

Pathway 2.2A
Community 2.2 to 2.1

Absence of disturbance that removes sagebrush canopy.

Pathway 2.3A
Community 2.3 to 2.2

Fire or other disturbance that removes the sagebrush canopy.

State 3
Tree State

The Tree State is characterized by an over dominance of shrubs and reduced perennial herbaceous understory. Traces of deep-rooted perennial bunchgrasses remain in the community. Non-native annual grasses and forbs are abundant in the understory. A biotic threshold has been crossed with the loss of the deep-rooted perennial bunchgrasses, reducing ecological resilience of the site. The loss of structural and functional groups (deep-rooted perennial bunchgrasses and shrub seedlings), result in decreased herbaceous production, soil moisture and organic matter inputs. Changes in infiltration and runoff rates contribute to reduced soil moisture availability thereby reducing reproductive potential and recruitment of native species.

Community 3.1
Tree/Sagebrush

Pinyon and juniper trees are increasing and becoming dominant. Black sagebrush is decreasing. Annual species dominate the understory. Native perennial bunchgrasses are found in trace amounts. Bare ground is increasing.

Community 3.2
Tree Dominated

Pinyon and juniper trees dominate the overstory. Black sagebrush is decadent or dead. Annual species dominate the understory. Bare ground is significant. Rill erosion is possible in this phase.

Pathway 3.1A
Community 3.1 to 3.2

Absence of disturbance and natural regeneration over time.

State 4
Tree State

The tree state is characterized by infilling of pinyon and juniper, with tree cover greater than 20 percent. Lack of natural disturbances including fire, disease or insect attack allows pinyon and juniper to increase in cover, dominate and change site dynamics. Understory vegetation is reduced through shading, duff accumulation and competition for water and nutrients. Feedbacks contributing to the stability of this alternative state include, reduced infiltration resulting from reduced vegetative cover, lower soil moisture preventing the establishment of vegetation, as well as, the density, the rate of spread and dominance of trees all contributing to an abiotic threshold being crossed. The ability of a site to capture, transport and store water is directly related to vegetative cover. Prolonged drought results in an overall decline of the plant community and reduced annual growth of pinyon and juniper.

Community 4.1
Annual Non-Native Species

Cheatgrass, Russian thistle, halogeton, or annual mustards dominate the plant community.

Community 4.2
Annual Non-Native Species/Sprouting Shrubs

Sprouting shrubs increase. Black sagebrush and perennial native bunchgrasses are a minor component, if present. Annual species dominate the understory.

Pathway 4.1A
Community 4.1 to 4.2

Absence of disturbance and natural regeneration of shrubs over time.

Pathway 4.2A
Community 4.2 to 4.1

Fire or other disturbance that removes the shrub canopy.

Transition T1A
State 1 to 2

Trigger: Introduction of non-native species. Slow variables: Surface disturbances, changes in the kinds of animals and their grazing patterns, drought and/or changes in fire history that altered the recruitment rates of native species. Threshold: Non-native invasive species cannot be easily removed from the system and have the potential to significantly alter disturbance regimes from their historic range of variation. Changes in the herbaceous understory, associated with the introduction of non-native annuals, reduce ecological resistance and resilience following a disturbance.

Transition T2A
State 2 to 3

Trigger: Chronic inadequate rest and recovery from defoliation and/or prolonged drought. Slow variables: Changes in historic wildfire patterns and frequency. Repeated, heavy growing season grazing changes natural recruitment and recovery rates of perennial herbaceous species. Threshold: Reduction of deep and shallow-rooted perennial bunchgrasses and increased bare ground/interspaces changes soil hydrology, decreasing infiltration and increasing runoff.

Transition T2B
State 2 to 4

Re-occurring severe fire.

Transition T3A
State 3 to 4

Trigger: Infiling by pinyon and juniper. Possibly coupled with chronic inadequate rest and recovery from defoliation and/or prolonged drought. Slow variables: Changes in historic wildfire patterns and frequency, as well ass, natural recruitment of native species over time. Threshold: Reduction of understory (deep-rooted perennial bunchgrass and woody perennials) and increased bare ground changed soil hydrology, including infiltration and runoff.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1	**Primary perennial grasses**			84–140	
	muttongrass	POFE	*Poa fendleriana*	56–84	–
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	28–56	–
2	**Seconday perennial grasses**			11–28	
	squirreltail	ELEL5	*Elymus elymoides*	2–11	–
	needle and thread	HECO26	*Hesperostipa comata*	2–11	–
	Sandberg bluegrass	POSE	*Poa secunda*	2–11	–
Forb					
3	**Perennial forbs**			28–56	
	rockcress	ARABI2	*Arabis*	2–11	–
	Indian paintbrush	CASTI2	*Castilleja*	2–11	–
	bastard toadflax	COUM	*Comandra umbellata*	2–11	–
	roundspike cryptantha	CRHU2	*Cryptantha humilis*	2–11	–
	threadleaf fleabane	ERFI2	*Erigeron filifolius*	2–11	–
	buckwheat	ERIOG	*Eriogonum*	2–11	–
	elkweed	FRSP	*Frasera speciosa*	2–11	–
	lousewort	PEDIC	*Pedicularis*	2–11	–
4	**Annual forbs**			1–17	
	bird's-beak	CORDY	*Cordylanthus*	1–11	–
Shrub/Vine					
5	**Primary shrubs**			235–336	
	black sagebrush	ARNO4	*Artemisia nova*	196–252	–
	Stansbury cliffrose	PUST	*Purshia stansburiana*	28–56	–
	desert ceanothus	CEGR	*Ceanothus greggii*	11–28	–
6	**Secondary shrubs**			28–112	
	wild crab apple	PERA4	*Peraphyllum ramosissimum*	2–17	–
	desert snowberry	SYLO	*Symphoricarpos longiflorus*	2–17	–
	banana yucca	YUBA	*Yucca baccata*	2–17	–
	littleleaf mountain mahogany	CEIN7	*Cercocarpus intricatus*	2–17	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	2–17	–
	mormon tea	EPVI	*Ephedra viridis*	2–17	–
	slender buckwheat	ERMI4	*Eriogonum microthecum*	2–17	–
	spiny greasebush	GLSP	*Glossopetalon spinescens*	2–17	–
	Fremont's mahonia	MAFR3	*Mahonia fremontii*	2–17	–
Tree					
7	**Evergreen**			1–11	
	Utah juniper	JUOS	*Juniperus osteosperma*	1–6	–
	singleleaf pinyon	PIMO	*Pinus monophylla*	1–6	–

Animal community

Livestock: This site has limited value for livestock grazing, due lack of available water sources and limited annual

production. Muttongrass is excellent forage for domestic livestock especially in the early spring. Indian ricegrass benefits from grazing if it is moderately grazed in the winter and early spring. Sandberg's bluegrass is not preferred by livestock and generally increases under normal grazing pressure. Overgrazing and severe trampling are damaging to stands of Sandberg's bluegrass. Black sagebrush is a valuable browse plant for domestic livestock. It is considered to be more palatable to domestic sheep and goats than to cattle or horses. Cattle sparingly use black sagebrush in the fall and winter when more desirable food is unavailable. Stansbury cliffrose is generally of medium palatability to livestock. It is an important forage species during the winter months. Desert ceanothus is considered fair to good, staple browse for livestock. It is preferred by domestic goats and sheep in the winter and early spring. Stocking rates vary over time depending on season of use, climate variations, site and previous and current management goals. A safe stocking rate is an estimated stocking rate that is fine-tuned by the client by adaptive management throughout the year and from year to year.

Wildlife: In Nevada, eight species are predominantly dependent on sagebrush habitat for most of their life history needs including pygmy rabbit, Great Basin pocket mouse, sagebrush vole, sagebrush lizard, Greater Sage-Grouse, Sage Thrasher, Brewer's Sparrow, and Sage Sparrow (the last three also occur as breeding species in Salt Desert scrub, but to a much lesser degree). Mule deer are also dependent on the sagebrush type to meet some of its life history requirements. Mule deer and pronghorn use black sagebrush communities extensively. However, wild ungulate may underutilize sagebrush if more palatable shrubs are available. Stansbury cliffrose provides important cover and forage for a variety of wildlife. It is considered to be important browse species for mule deer, elk, desert bighorn sheep and pronghorn. Rodents and small mammals eat the seeds of Stansbury cliffrose. Desert ceanothus is important forage in the winter and early spring because of its evergreen leaves. Elk, deer and desert bighorn sheep consume the foliage. Small mammals, insects and birds eat the seeds. Muttongrass begins growing is late winter and is available before many other forage plants. Deer and elk heavily use muttongrass in early spring when other green forage is scarce. Muttongrass cures well and can provide important winter forage for wildlife in some areas. Indian ricegrass provides a source of green feed early in the spring. It is eaten by pronghorn whenever available. Small mammals and birds frequently eat the seeds of Indian ricegrass.

The Greater Sage-Grouse is probably the species most highly adapted to the use of sagebrush itself. Sage grouse are equipped with a specially-designed grinding organ that fuses the crop and the gizzard to address the difficult challenges of digesting sagebrush herbaceous matter. Ninety-eight percent of the year-round diet of the adult sage grouse is comprised of sagebrush leaves, which gives the bird the ability to winter on sagebrush range. Sagebrush range in good condition also supports a lush understory of bunchgrasses and forbs. The presence of this highly productive understory is critical to the needs of other wildlife species, including the sagebrush vole. The various shrew species that live in sagebrush are insectivores, but they depend on the productivity of the herbaceous component for the abundant production of their prey items, as well as for cover. Several species nest on habitats adjacent to sagebrush habitat, but spend most of their hunting time over sagebrush range where they primarily prey on ground squirrels and jack rabbits (e.g., Prairie falcons on cliffs and rimrock, and Ferruginous hawks on the piñon-juniper edge or sometimes on rimrock). In eastern Nevada, bald eagles winter on sagebrush valley bottoms in widely scattered singles or pairs, preying chiefly on jack rabbits – somewhat of a deviation from their normal expected wintering strategies (fish and waterfowl).

Hydrological functions

Under reference conditions runoff associated with this site is very high and permeability is moderately slow. Changes in community phases lead to changes in infiltration and runoff rates. Reduction in in the amount of perennial bunchgrasses reduces infiltration and accelerates runoff due to a change in growth form and root morphology characteristics.

Recreational uses

This ecological site has potential for upland game and bird hunting. It also provides wonderful vistas and opportunities to view wildflowers in the spring and early summer.

Wood products

Insignificant amounts of wood products, including fuel wood, are available on this site under reference conditions. However, in state 4, when community phases have in-filled with pinyon and juniper this site may be suitable for fuel wood harvesting.

Inventory data references

NASIS soil component data.

Type locality

Location 1: Nye County, NV	
Township/Range/Section	T4N R57E S35
UTM zone	N
UTM northing	4225150
UTM easting	628112
Latitude	38° 9′ 54″
Longitude	115° 32′ 15″
General legal description	MDBM. Adaven 7.5 minute topographic quadrangle, Grant Range Nye County, NV. Approximately 4 miles northeast of Adaven, Nevada and approximately 2 miles from the head of Bruno Creek.

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Contributors

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E. Hourihan

Approval

Kendra Moseley, 2/20/2025

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)	E.Hourihan
Contact for lead author	
Date	10/23/2012
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** A few rills may be present on steeper slopes, especially after summer convection storms.

2. **Presence of water flow patterns:** Water flow patterns are none to few and are located in the interspaces between shrubs, not connected.

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 rock fragments.

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

6. **Extent of wind scoured, blowouts and/or depositional areas:** No wind-scoured or blow out areas. Small depositional areas found up slope of grasses and large shrubs.

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 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):**

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) slow runoff and increase infiltration. Shrub canopy and associated litter break raindrop impact and provide opportunity for snow and overland flow catchment positively contributing to soil moisture storage.

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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. Subsurface calcic or petrocalcic horizons are not to be interpreted as compacted layers.

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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: Low growing evergreen shrubs (black sagebrush)> deep-rooted, cool season, perennial bunchgrasses (muttongrass & Indian ricegrass)> sprouting shrubs> deep-rooted, cool season, perennial forbs= additional cool-season, perennial bunchgrasses> additional shrubs>shallow-rooted, perennial forbs & annual forbs.

    Sub-dominant:

    Other:

    Additional: succulents and evergreen trees

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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 canopy material may be as much as 20% of total woody canopy; few mature bunchgrasses (<10%) have dead centers.

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14. **Average percent litter cover (%) and depth (in):** Under shrubs and within plant interspaces (25 to 35%) and depth of litter is ±¼ inch.

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For a normal or average growing season (through mid-June) ~500LBs/ac; favorable or above average years ~700LBs/ac; unfavorable or below average years ~300LBs/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 ecological site include but are not limited to cheatgrass, red brome, Russian thistle and annual mustards.

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17. **Perennial plant reproductive capability:** All function groups should reproduce in average (or normal) and above average (or favorable) growing seasons. Litter growth or reproduction occurs in below average (or unfavorable) and

extreme drought years.