USDA Natural Resources
Conservation Service

Ecological site R029XY009NV
UPLAND WASH

Last updated: 2/20/2025
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.

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.

Ecological site concept

The Upland Wash site occurs in drainageways on intermountain valley fans and active channels of hills and mountains and on inset fans of upper piedmont slopes. Slopes range from 2 to 15 percent, but slope gradients of 4 to 8 percent are most typical. Elevations are 3800 to 6200 feet. Flooding may occur occasionally and is very brief. The soils are deep alluvium from mixed sources. They are quite variable as they continue to be re-worked by water.

Associated sites

R029XY014NV	**SHALLOW CALCAREOUS SLOPE 8-12 P.Z.** Black sagebrush dominated. This site occurs on summits and backslopes of hills and mountains, fan remnants, and rock pediments. Slopes range from 2 to over 75 percent, but slope gradients of 15 to 50 percent are typical. Elevations are 4300 to about 8800 feet. The soils on this site are calcareous or carbonatic and have a shallow effective rooting zone with depth to a hardpan or bedrock ranging from 5 to 20 inches. The soils have high amounts of gravels throughout the soil profile and are well drained to moderately well drained. The soil surface typically has a cover of 75 percent or more rock fragments.
R029XY077NV	**SHALLOW GRAVELLY LOAM 8-10 P.Z.** This site occurs on fan remnants, lower mountain and hill sideslopes of all exposures. Slopes range from 2 to 50 percent. Elevations are 3600 to about 6500 feet. The soils are shallow to moderately deep and well drained. Surface soils are medium to coarse textured. Subsoils are generally heavy textured with a high percent of gravels.

Similar sites

R029XY072NV	**VALLEY WASH** ATCA2-AMER codominant
R029XY158NV	**COARSE LOAMY 8-10 P.Z.** Stable plant community; ARTRW8-ATCA2 codominant
R029XY114NV	**LOAMY FAN 8-12 P.Z.** Stable plant community; ARTRW8 dominant shrub; LECI4-ACHY codominant grasses
R029XY049NV	**SANDY LOAM 8-12 P.Z.** Stable plant community; ARTRW8 dominant shrub
R029XY041NV	**DRY WASH** ARTR2 rare to absent; ERNAN5-ATCA2 codominant; lower elevations

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata* (2) *Prunus fasciculata*
Herbaceous	(1) *Poa secunda* (2) *Achnatherum hymenoides*

Physiographic features

The Upland Wash site occurs on intermountain valley fans and active channels of hills and mountains and on inset fans of upper piedmont slopes. Slopes range from 2 to 15 percent, but slope gradients of 4 to 8 percent are most typical. Elevations are 3800 to 6200 feet.

Table 2. Representative physiographic features

Landforms	(1) Intermontane basin (2) Inset fan (3) Hill (4) Drainageway
Runoff class	Negligible to medium

Flooding duration	Very brief (4 to 48 hours)
Flooding frequency	None to occasional
Ponding frequency	None
Elevation	3,800–6,200 ft
Slope	2–15%
Water table depth	72 in
Aspect	Aspect is not a significant factor

Climatic features

The climate associated with this site is semiarid, characterized by cold, moist winters and warm, somewhat dry summers. Average annual precipitation is 8 to 12 inches. Mean annual air temperature is 49 to 55 degrees F. The average growing season is about 110 to 220 days.

Table 3. Representative climatic features

Frost-free period (characteristic range)	85 days
Freeze-free period (characteristic range)	131 days
Precipitation total (characteristic range)	6 in
Frost-free period (actual range)	85 days
Freeze-free period (actual range)	131 days
Precipitation total (actual range)	6 in
Frost-free period (average)	85 days
Freeze-free period (average)	131 days
Precipitation total (average)	6 in

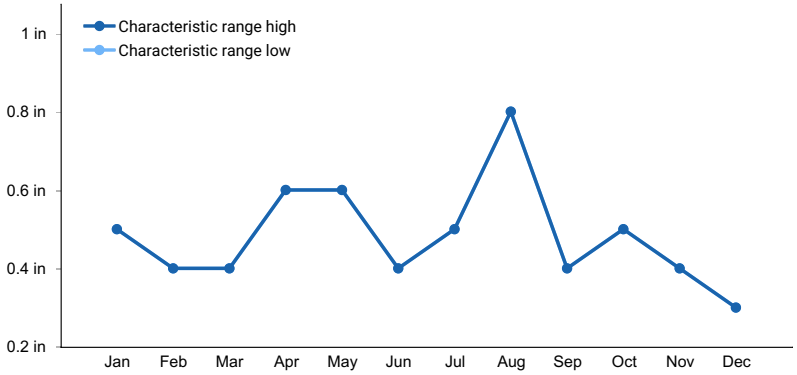


Figure 1. Monthly precipitation range

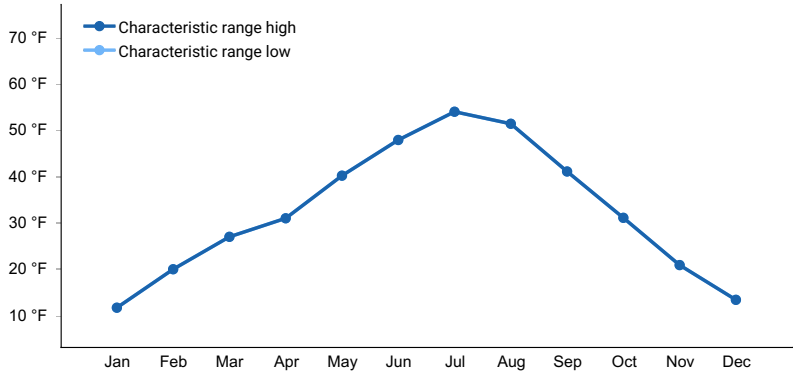


Figure 2. Monthly minimum temperature range

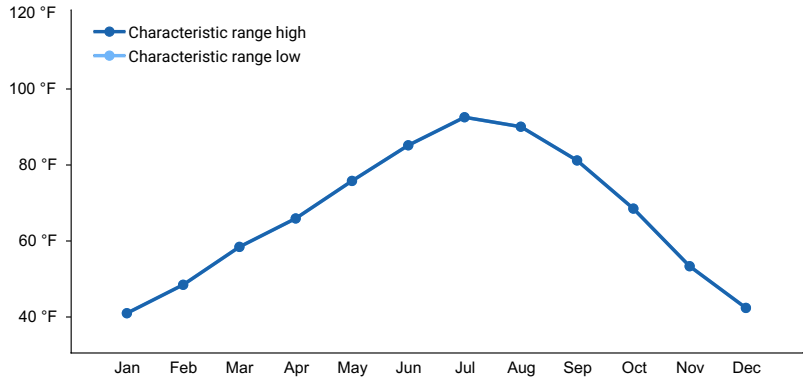


Figure 3. Monthly maximum temperature range

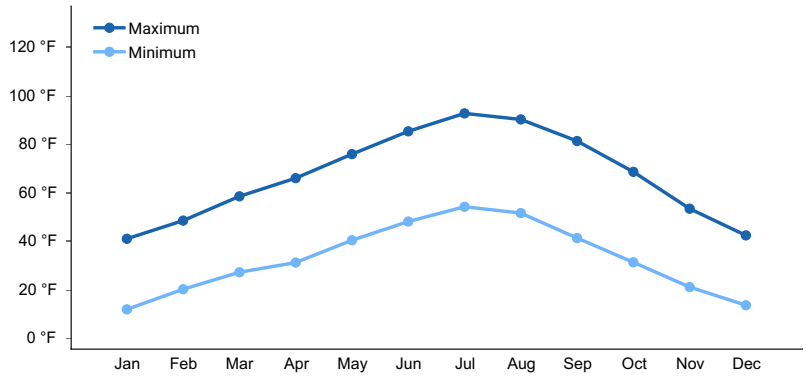


Figure 4. Monthly average minimum and maximum temperature

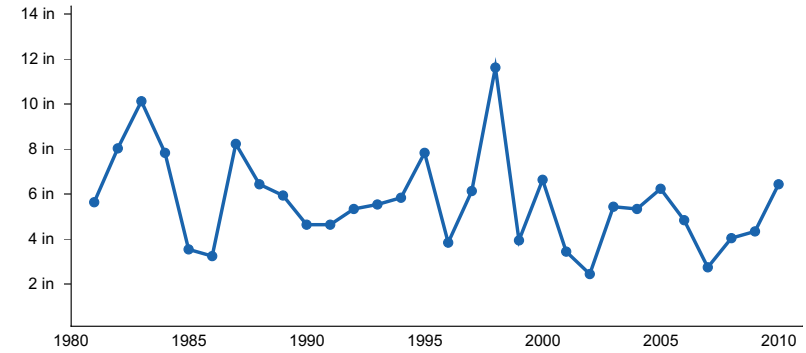


Figure 5. Annual precipitation pattern

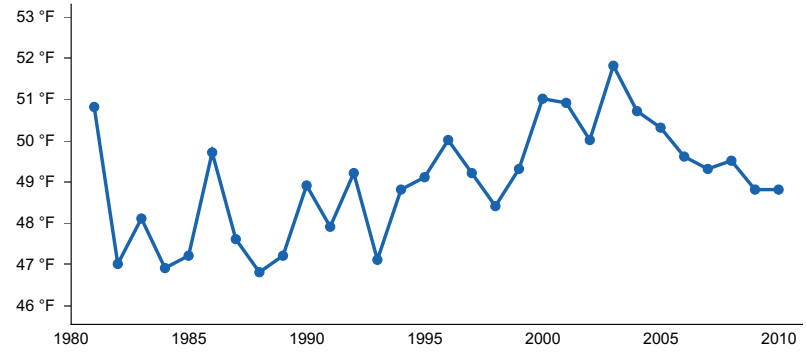


Figure 6. Annual average temperature pattern

Climate stations used

- (1) TWIN SPRING FALLINI [USC00268443], Tonopah, NV

Influencing water features

The Upland Wash is associated with drainageways that flood occasionally during storm events.

Soil features

The soils in this site are deep alluvium from mixed sources. They are quite variable as they continue to be re-worked by water. These soils typically have high amounts of gravels and cobbles distributed throughout the soil profile as well as at the surface. Water intake rates are rapid, available water capacity is low, runoff is medium and the soils are well drained. Correlated soil components are: Annabella, Bigwash, Devildog, Heist, Mosida, Pagecreek, Veet, Wrango, Typic Torriorthents, Ustic Torriorthents, Ustollic Haplocambids, Xeric Torrifluvents, and Xeric Torriorthents.

Table 4. Representative soil features

Parent material	(1) Alluvium–limestone (2) Alluvium–volcanic rock (3) Alluvium–welded tuff
Surface texture	(1) Ashy, very gravelly coarse sandy loam (2) Gravelly sandy loam
Drainage class	Well drained to excessively drained
Permeability class	Moderate to very rapid
Soil depth	72 in
Surface fragment cover <=3"	0–48%
Surface fragment cover >3"	0–3%
Available water capacity (Depth not specified)	0.9–3.7 in
Calcium carbonate equivalent (Depth not specified)	0–15%
Electrical conductivity (Depth not specified)	0–4 mmhos/cm
Sodium adsorption ratio (Depth not specified)	0–5
Soil reaction (1:1 water) (Depth not specified)	7.4–9
Subsurface fragment volume <=3" (Depth not specified)	0–52%
Subsurface fragment volume >3" (Depth not specified)	0–12%

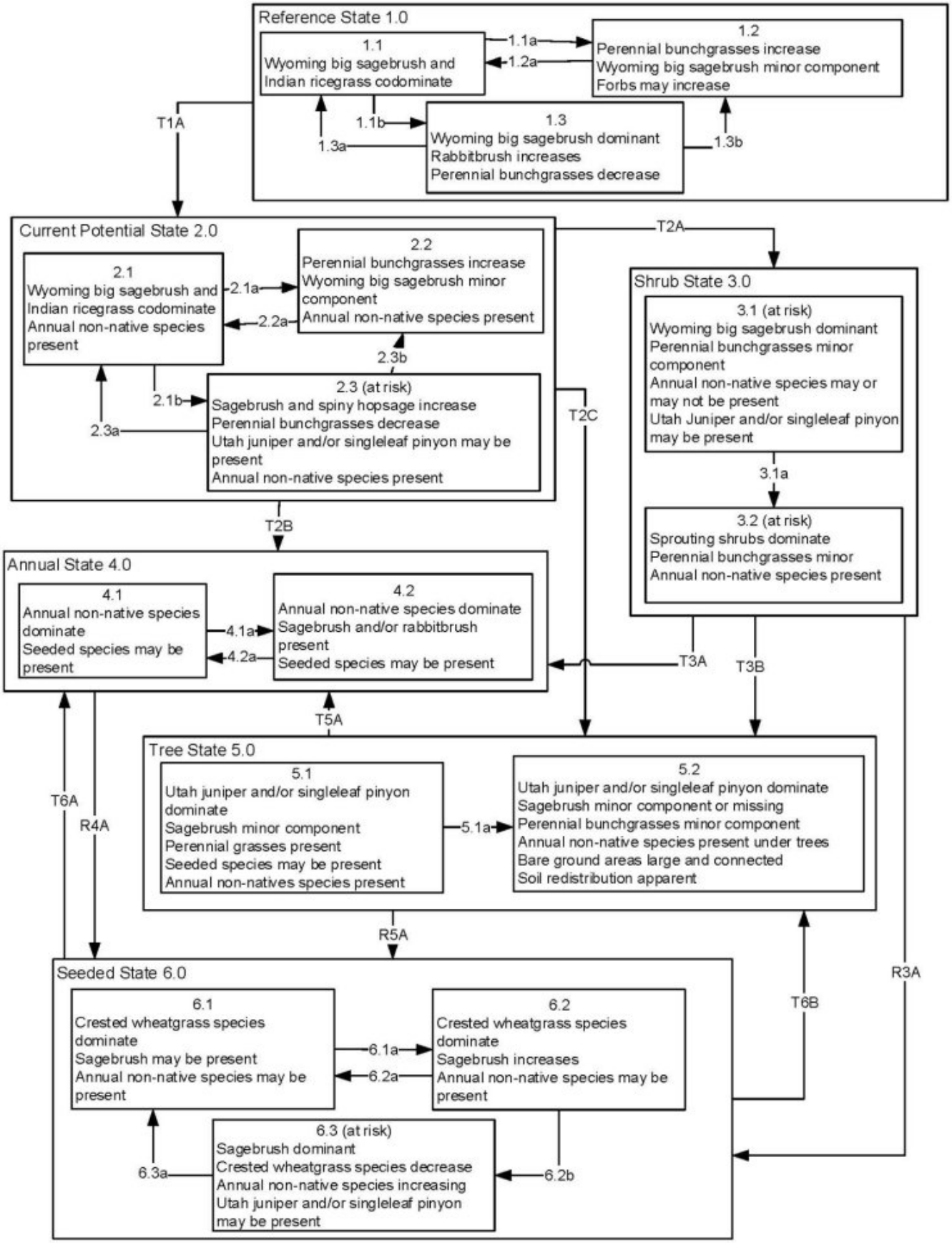
Ecological dynamics

This site is frequently disturbed by intense, natural, flood flows. Rubber rabbitbrush is the dominant shrub as the plant community begins to stabilize following major disturbance. Species likely to invade this site are annuals such as cheatgrass and mustards. Ratings of ecological condition and determinations of similarity index are not applicable to this site due to the inherent instability of the plant community.

Fire Ecology:
The fire return interval for Wyoming big sagebrush communities range from is 10 to 70 years. Fire is the principal means of renewal for decadent stands of Wyoming big sagebrush. Wyoming big sagebrush establishes after fire from a seedbank; from seed produced by remnant plants that escaped fire; and from plants adjacent to the burn that seed in. Fires in Wyoming big sagebrush are usually not continuous, and remnant plants are the principal means of postfire reproduction.
Mountain big sagebrush is highly susceptible to injury from fire. Plants are readily killed in all seasons, even light severity fires. Mountain big sagebrush plants top-killed by fire will not resprout. Big sagebrush is readily killed when

aboveground plant parts are charred by fire. If sagebrush foliage is exposed to temperature above 195 degrees Fahrenheit for longer than 30 seconds, the plant dies. Prolific seed production from nearby unburned plants coupled with high germination rates enables seedlings to establish rapidly following fire. Desert almon resprouts following fire. Rubber rabbitbrush is often top-killed by fire. Rubber rabbitbrush is a fire-adapted species that is typically unharmed or enhanced by fire. Recovery time is often rapid to very rapid. Rubber rabbitbrush is often one of the first species to colonize burned areas by sprouting or from off-site seed. Indian ricegrass can be killed by fire, depending on severity and season of burn. Sandberg bluegrass is generally unharmed by fire. It produces little litter, and its small bunch size and sparse litter reduces the amount of heat transferred to perennating buds in the soil. Its rapid maturation in the spring also reduces fire damage, since it is dormant when most fires occur. Indian ricegrass reestablishes on burned sites through seed dispersed from adjacent unburned areas. Galleta is a rhizomatous perennial which can resprout after top-kill by fire.

State and transition model


Reference State 1.0
1.1
Wyoming big sagebrush and
Indian ricegrass codominate
1.2
Perennial bunchgrasses increase
Wyoming big sagebrush minor component
Forbs may increase
1.3
Wyoming big sagebrush dominant
Rabbitbrush increases
Perennial bunchgrasses decrease
1.1a
1.2a
1.1b
1.3a
1.3b
T1A
Current Potential State 2.0
2.1
Wyoming big sagebrush and
Indian ricegrass codominate
Annual non-native species present
2.2
Perennial bunchgrasses increase
Wyoming big sagebrush minor component
Annual non-native species present
2.3 (at risk)
Sagebrush and spiny hopsage increase
Perennial bunchgrasses decrease
Utah juniper and/or singleleaf pinyon may be present
Annual non-native species present
2.1a
2.2a
2.3b
2.1b
2.3a
T2A
T2B
T2C
Shrub State 3.0
3.1 (at risk)
Wyoming big sagebrush dominant
Perennial bunchgrasses minor component
Annual non-native species may or may not be present
Utah Juniper and/or singleleaf pinyon may be present
3.1a
3.2 (at risk)
Sprouting shrubs dominate
Perennial bunchgrasses minor
Annual non-native species present
Annual State 4.0
4.1
Annual non-native species dominate
Seeded species may be present
4.2
Annual non-native species dominate
Sagebrush and/or rabbitbrush present
Seeded species may be present
4.1a
4.2a
T3A
T3B
T5A
Tree State 5.0
5.1
Utah juniper and/or singleleaf pinyon dominate
Sagebrush minor component
Perennial grasses present
Seeded species may be present
Annual non-natives species present
5.2
Utah juniper and/or singleleaf pinyon dominate
Sagebrush minor component or missing
Perennial bunchgrasses minor component
Annual non-native species present under trees
Bare ground areas large and connected
Soil redistribution apparent
5.1a
T6A
R4A
R5A
T6B
R3A
Seeded State 6.0
6.1
Crested wheatgrass species dominate
Sagebrush may be present
Annual non-native species may be present
6.2
Crested wheatgrass species dominate
Sagebrush increases
Annual non-native species may be present
6.3 (at risk)
Sagebrush dominant
Crested wheatgrass species decrease
Annual non-native species increasing
Utah juniper and/or singleleaf pinyon may be present
6.1a
6.2a
6.3a
6.2b

Reference State 1.0 Community Phase Pathways
1.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral community, dominated by grasses and forbs.
1.1b: Time and lack of disturbance such as fire or drought. Excessive herbivory may also decrease perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Low severity fire or Aroga moth infestation resulting in a mosaic pattern.
1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community.

Transition T1A: Introduction of non-native species such as bulbous bluegrass, cheatgrass and thistles.

Current Potential State 2.0 Community Phase Pathways
2.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral community dominated by grasses and forbs; non-native annual species present.
2.1b: Time and lack of disturbance such as fire or drought. Inappropriate grazing management may also reduce perennial understory.
2.2a: Time and lack of disturbance allows for regeneration of sagebrush.
2.3a: Low severity fire or Aroga moth infestation creates sagebrush/grass mosaic. Brush management with minimal soil disturbance; late-fall/winter grazing causing mechanical damage to sagebrush.
2.3b: High severity fire significantly reduces sagebrush cover leading to early mid-seral community.

Transition T2A: Time and lack of disturbance and/or inappropriate grazing management (3.1).
Transition T2B: High severity fire and/or soil disturbance (4.1). Inappropriate grazing that favors shrubs in the presence of non-native annual species (4.2).
Transition T2C: Time and lack of disturbance allows for an increase in tree cover; inappropriate grazing management and/or chronic drought can reduce fine fuels and lead to increased tree establishment and dominance (5.1).

Shrub State 3.0 Community Phase Pathways
3.1a: Fire.

Transition T3A: Catastrophic fire and/or soil disturbance (4.1). Inappropriate grazing management in the presence of non-native annual species (4.2).
Transition T3B: Time and a lack of fire allows for trees to dominate site; may be coupled with inappropriate grazing management (5.1).

Restoration R3A: Brush management with minimal soil disturbance, coupled with seeding of desired species. Probability of success very low (6.1).

Annual State 4.0 Community Phase Pathways
4.1a: Time and lack of fire, unlikely to occur.
4.2a: Fire.

Restoration R4A: Seeding of desired species; may be coupled with herbicide; probability of success very low (6.1).

Tree State 5.0 Community Phase Pathways
5.1a: Time and lack of disturbance allows for tree maturation

Restoration R5A: Tree removal and seeding of desired species.

Transition T5A: Catastrophic fire, inappropriate tree removal practices (5.1).

Seeded State 6.0 Community Phase Pathways
6.1a: Time and lack of disturbance may be coupled with inappropriate grazing management.
6.2a: Low severity fire.
6.2b: Inappropriate grazing management reduces bunchgrasses and increases density of sagebrush; usually a slow transition.
6.3a: Fire or brush treatment with minimal soil disturbance.

Transition T6A: Catastrophic fire and/or inappropriate grazing management.
Transition T6B: Time and a lack of fire allows for trees to dominate site; may be coupled with inappropriate grazing management (5.1).

Animal community

Livestock Interpretations:
This site is suited to livestock grazing. Grazing management should be keyed to Sandberg's bluegrass, Indian ricegrass, and galleta production. Bluegrass is a widespread forage grass. It is one of the earliest grasses in the

spring and is sought by domestic livestock and several wildlife species. Sandberg bluegrass is a palatable species, but its production is closely tied to weather conditions. It produces little forage in drought years, making it a less dependable food source than other perennial bunchgrasses. 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. When actively growing, galleta provides good to excellent forage for cattle and horses and fair forage for domestic sheep. Although not preferred, all classes of livestock may use galleta when it is dry. Domestic sheep show greater use in winter than summer months and typically feed upon central portions of galleta tufts, leaving coarser growth around the edges. Galleta may prove somewhat coarse to domestic sheep. Basin big sagebrush may serve as emergency food during severe winter weather, but it is not usually sought out by livestock. Livestock browse Wyoming big sagebrush, but may use it only lightly when palatable herbaceous species are available. 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. Desert almond is seasonally important forage species on dry ranges where it grows. Livestock consume the foliage in the spring and following rainy periods. In general, livestock forage only lightly on rubber rabbitbrush during the summer, but winter use can be heavy in some locations. Fall use is variable, but flowers are often used by livestock. A few leaves and the more tender stems may also be used.

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:
Basin big sagebrush is the least palatable of all the subspecies of big sagebrush. Basin big sagebrush is browsed by mule deer from fall to early spring, but is not preferred. Wyoming big sagebrush is preferred browse for wild ungulates. Pronghorn usually browse Wyoming big sagebrush heavily. Mountain big sagebrush is highly preferred and nutritious winter forage for mule deer and elk. Sagebrush-grassland communities provide critical sage-grouse breeding and nesting habitats. Meadows surrounded by sagebrush may be used as feeding and strutting grounds. Sagebrush is a crucial component of their diet year-round, and sage-grouse select sagebrush almost exclusively for cover. Sage-grouse prefer mountain big sagebrush and Wyoming big sagebrush communities to basin big sagebrush communities.
Wildlife forage only lightly on rubber rabbitbrush during the summer, but winter use can be heavy in some locations. Fall use is variable, but flowers are often used by wildlife. A few leaves and the more tender stems may also be used. The forage value of rubber rabbitbrush varies greatly among subspecies and ecotypes. Desert almond is not desirable to livestock species. Indian ricegrass is eaten by pronghorn in "moderate" amounts whenever available. In Nevada it is consumed by desert bighorns. 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. In Nevada, Indian ricegrass may even dominate jackrabbit diets during the spring through early summer months. 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. Bluegrass is an important forage species for several wildlife species in the spring and early summer. Desert bighorn sheep of the Mojave Desert utilize galleta as forage. Galleta provides moderately palatable forage when actively growing and relatively unpalatable forage during dormant periods. Galleta provides poor cover for most wildlife species.

Hydrological functions

This is an area of erosion and deposition.

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

Some Native American peoples used the bark of big sagebrush to make rope and baskets. Native Americans made tea from big sagebrush leaves. They used the tea as a tonic, an antiseptic, for treating colds, diarrhea, and sore eyes and as a rinse to ward off ticks. Big sagebrush seeds were eaten raw or made into meal. 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 seed as a reserve food source.

Other information

Basin big sagebrush shows high potential for range restoration and soil stabilization. Basin big sagebrush grows rapidly and spreads readily from seed. Wyoming big sagebrush is used for stabilizing slopes and gullies and for restoring degraded wildlife habitat, rangelands, mine spoils and other disturbed sites. It is particularly recommended on dry upland sites where other shrubs are difficult to establish.

Inventory data references

NASIS data used to develop abiotic narratives and tables.

Type locality

Location 1: Lincoln County, NV	
Township/Range/Section	T6S R66E S18
General legal description	Willow Creek area, Delamar Mountains, Lincoln County, Nevada. This site also occurs in Nye County, Nevada.

Other references

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

United States Department of Agriculture, Natural Resources Conservation Service. 2022. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture, Agriculture Handbook 296.

USDA-NRCS Plants Database (Online; http://www.plants.usda.gov).

Contributors

HA/RRK
TK Stringham (STM)

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)	P NOVAK-ECHENIQUE
Contact for lead author	State Rangeland Management Specialist
Date	05/16/2013
Approved by	Kendra Moseley
Approval date	

Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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2. **Presence of water flow patterns:** Water flow patterns are few to common, especially after summer convection storms and spring runoff. Water flow patterns are connected and long (> 5 ft).

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3. **Number and height of erosional pedestals or terracettes:** Pedestals are rare with occurrence typically limited to areas within water flow patterns.

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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 to 20%; surface rock fragments to 70%; shrub canopy to 13%; perennial herbaceous plant cover to 7%.

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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 during intense summer convection storms or rapid snowmelt events. Persistent litter (large woody material) will remain in place except during large rainfall events.

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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 should be 1 to 4 on most soil textures found on this site. (To be field tested.)

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Surface structure is typically weak coarse platy to moderate medium subangular blocky. Soil surface colors are light browns and grays and soils are typified by an ochric epipedon. Organic matter of the surface 2 to 3 inches is less than 1 percent.

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Sparse shrub canopy and associated litter provide some protection from raindrop impact. Perennial grasses aid in infiltration and reduce runoff.

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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):** None. Platy or massive sub-surface horizons are not to be interpreted as compacted layers.

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant: evergreen shrubs (big sagebrush)

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

    Other:

    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 25% of total woody canopy; mature bunchgrasses commonly (±25%) have dead centers.

14. **Average percent litter cover (%) and depth (in):** Between plant interspaces and under canopy up to 35% and depth <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 ±700 lbs/ac. Favorable years ± 1000 lbs/ac and unfavorable years ± 500 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 on this site include red brome, cheatgrass, annual mustards, and salt cedar.

17. **Perennial plant reproductive capability:** All functional groups should reproduce in average and above-average growing season years. Reduced growth and reproduction occur during drought years.