USDA Natural Resources
Conservation Service

Ecological site R023XY075NV
SHALLOW HILL 10-12 P.Z.

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General information

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

Ecological site concept

Currently there is only a draft of the initial concept for this ecological site. The initial concept for this site places it within the Loamy Aridic Plateaus Low Production Wyoming and Lahontan Sagebrush sites w Sparse Juniper Ecological Site Group. To view the General STM and other information available for this ESG please go to https://edit.jornada.nmsu.edu/catalogs/esg/023X/R023XY910NV

This site is slightly less productive than the modal site with 200 lbs/ac in normal years. This site is typically found on 30 to 50 percent slopes at elevations from 5000 to 6500 feet with 10 to 12 inches of average annual production. The soils of this site are similar to the modal site with shallow depths and high runoff potential but the grass community is dominated by Salmon wildrye rather than Thurber's needlegrass. The shrub community is dominated by Lahontan sagebrush. Utah juniper is also present on this site up to 5% canopy cover. This model is similar to the group modal site with four stable states

Associated sites

R023XY076NV	**LOAMY HILL 10-14 P.Z.**
R023XY077NV	**SHALLOW LOAM 10-14 P.Z.**

Similar sites

R023XY077NV	**SHALLOW LOAM 10-14 P.Z.** ARTRW8 dominant shrub; less productive site
R023XY076NV	**LOAMY HILL 10-14 P.Z.** ARTRW8 dominant shrub; more productive site

F023XY045NV	**JUOS/ARARL3/ACTH7/ACSP12** JUOS canopy cover greater than 10%

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia arbuscula var. longiloba*
Herbaceous	(1) *Leymus salinus ssp. salmonis*

Physiographic features

This site occurs on summits and sideslopes of hills and low elevation plateaus and mountains. Although the site may be found on all aspects, at higher elevations the site is restricted to south-facing slopes. Slope gradients of 15 to 50 percent are most typical. Elevations are 5000 to 6500 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountain (2) Hill (3) Plateau
Elevation	1,524–1,981 m
Slope	15–50%
Aspect	Aspect is not a significant factor

Climatic features

The climate associated with this site is semiarid and characterized by cool, moist winters and warm, dry summers. Average annual precipitation is 10 to 12 inches. Mean annual air temperature is 50 degrees F. The average growing season is about 90 to 120 days.

Nevada’s climate is predominantly arid, with large daily ranges of temperature, infrequent severe storms, heavy snowfall in the higher mountains, and great location variations with elevation. Three basic geographical factors largely influence Nevada’s climate: continentality, latitude, and elevation. Continentality is the most important factor. The strong continental effect is expressed in the form of both dryness and large temperature variations. Nevada lies on the eastern, lee side of the Sierra Nevada Range, a massive mountain barrier that markedly influences the climate of the State. The prevailing winds are from the west, and as the warm moist air from the Pacific Ocean ascend the western slopes of the Sierra Range, the air cools, condensation occurs and most of the moisture falls as precipitation. As the air descends the eastern slope, it is warmed by compression, and very little precipitation occurs. The effects of this mountain barrier are felt not only in the West but throughout the state, with the result that the lowlands of Nevada are largely

desert or steppes. The temperature regime is also affected by the blocking of the inland-moving maritime air. Nevada sheltered from maritime winds, has a continental climate with well-developed seasons and the terrain responds quickly to changes in solar heating. Nevada lies within the mid-latitude belt of prevailing westerly winds which occur most of the year. These winds bring frequent changes in weather during the late fall, winter and spring months, when most of the precipitation occurs. To the south of the mid-latitude westerlies, lies a zone of high pressure in subtropical latitudes, with a center over the Pacific Ocean. In the summer, this high-pressure belt shifts northward over the latitudes of Nevada, blocking storms from the ocean. The resulting weather is mostly clear and dry during the summer and early fall, with scattered thundershowers. The eastern portion of the state receives significant summer thunderstorms generated from monsoonal moisture pushed up from the Gulf of California, known as the North American monsoon. The monsoon system peaks in August and by October the monsoon high over the Western U.S. begins to weaken and the precipitation retreats southward towards the tropics (NOAA 2004).

Average annual precipitation is 16 to over 20 inches. Mean annual air temperature is 41 to 44 degrees F. The average growing season is about 50 to 70 days.

Mean annual precipitaion at the Bear Creek, Nevada SNOTEL station (170501020301) is 37.69 inches.

monthly mean precipitation is:
January 3.84; February 3.75; March 4.38; April 4.9;
May 3.99; June 2.82; July .95; August 1.66;
September 1.22; October 2.12;
November 3.67; December 4.38.

Table 3. Representative climatic features

Frost-free period (average)	105 days
Freeze-free period (average)	
Precipitation total (average)	279 mm

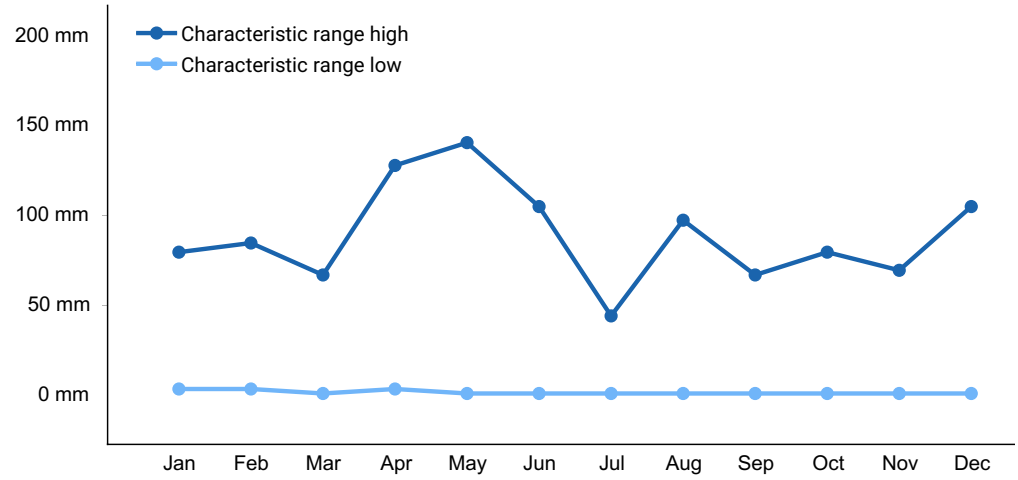

Figure 1. Monthly precipitation range

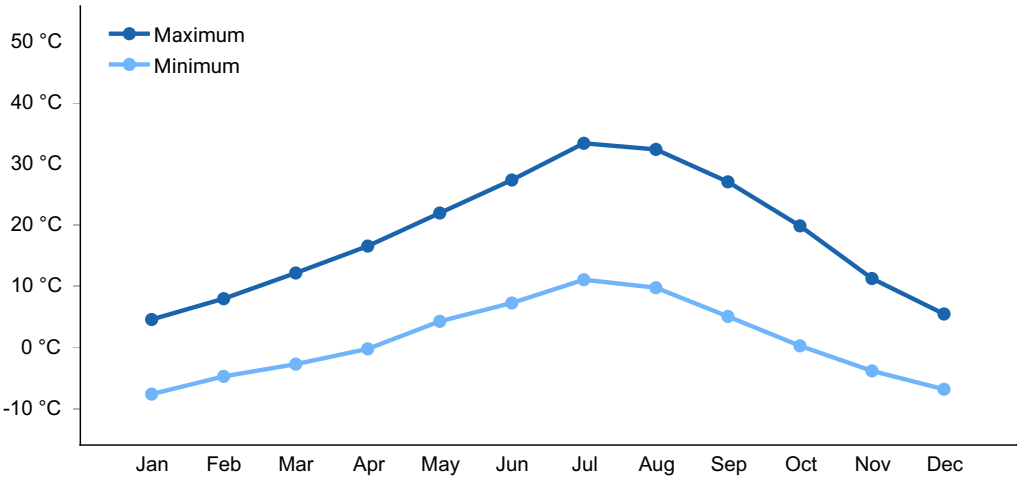

Figure 2. Monthly average minimum and maximum temperature

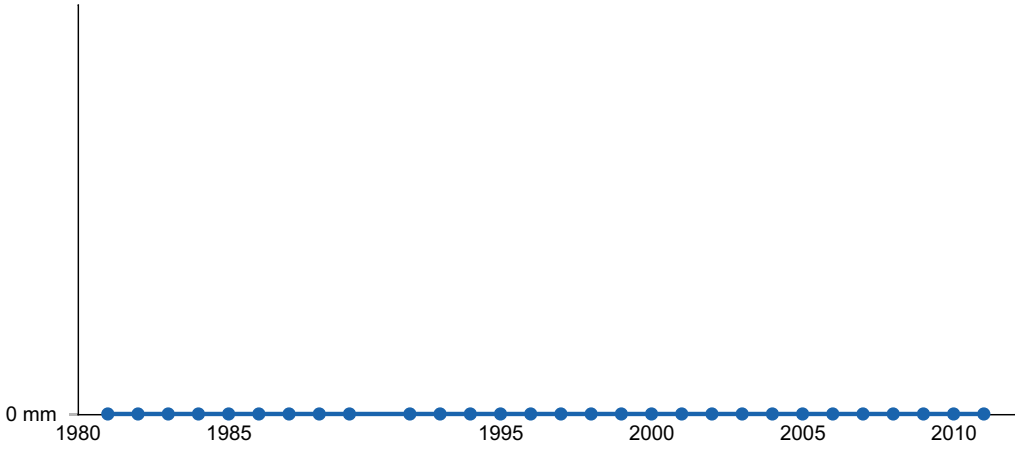

Figure 3. Annual precipitation pattern

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site are shallow to very shallow and have formed in residuum and colluvium from extrusive igneous rocks. The soil surface is medium in texture over a fine-textured subsoil. Permeability is moderate and the soils are well drained. Available water capacity is very low. Infiltration is restricted once these soils are wetted and they are subject to water loss by runoff. The soils have high amounts of gravel and/or cobbles on the surface which provide a stabilizing affect on surface erosion conditions. The soils are classified as Lithic Xerollic Haplargids.

Table 4. Representative soil features

Surface texture	(1) Very gravelly loam
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate
Soil depth	10–30 cm
Available water capacity (0-101.6cm)	2.54–7.62 cm
Calcium carbonate equivalent (0-101.6cm)	0%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	6.6–7.8

Ecological dynamics

As ecological condition declines, Lahontan sagebrush, rabbitbrush, bottlebrush squirreltail, and Sandberg's bluegrass increase as Salmon wildrye, Thurber's needlegrass and other desirable forage grasses decrease.

Fire Ecology:
The mean fire return intervals for Lahontan sagebrush communities have been estimated to be from 35 to over 100 years. Fire most often occurs during wet years with high forage production. Lahontan sagebrush is very susceptible to fire damage. Lahontan sagebrush is usually killed by fire and does not re-sprout. The recovery in burned areas is usually via small, light, wind-dispersed seed for all low sagebrush subspecies. Partially injured Lahontan sagebrush may re-grow from living branches, but sprouting does not occur. Nevada ephedra generally sprouts after fire damages aboveground vegetation.

Underground regenerative structures commonly survive when aboveground vegetation is consumed by fire. However, severe fires may kill shallowly buried regenerative structures. Purple sage has a high tolerance to fire and will resprout following fire. Little is known regarding the specific relationship between Salmon wildrye and fire. Salmon wildrye can survive fire via its root crown and rhizomes. Bottlebrush squirreltail's small size, coarse stems, and sparse leafy material aid in its tolerance of fire. Postfire regeneration occurs from surviving root crowns and from on- and off-site seed sources. Frequency of disturbance greatly influences postfire response of bottlebrush squirreltail. Undisturbed plants within a 6 to 9 year age class generally contain large amounts of dead material, increasing bottlebrush squirreltail's susceptibility to fire. 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.

State and transition model

Ecosystem states

1. Reference Plant Community

State 1 submodel, plant communities

1.1. Reference Plant Community

State 1
Reference Plant Community

Community 1.1
Reference Plant Community

The reference plant community is dominated by Lahontan sagebrush and Salmon wildrye under an open canopy of Utah juniper. Utah juniper canopy cover is less than 5 percent. Potential vegetative composition is about 30% grasses, 5% forbs and 65% shrubs and trees. Approximate ground cover (basal and crown) is about 5 to 15 percent.

Table 5. Annual production by plant type

Plant Type	Low (Kg/Hectare)	Representative Value (Kg/Hectare)	High (Kg/Hectare)
Shrub/Vine	101	135	168
Grass/Grasslike	50	67	84
Tree	9	11	15
Forb	8	11	13
Total	**168**	**224**	**280**

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**			49–90	
	Salmon wildrye	LESAS2	*Leymus salinus ssp. salmonis*	34–56	–
	squirreltail	ELEL5	*Elymus elymoides*	11–22	–
	Sandberg bluegrass	POSE	*Poa secunda*	4–11	–
2	**Secondary Perennial Grasses**			4–11	
	Indian ricegrass	ACHY	*Achnatherum hymenoides*	1–7	–
	Thurber's needlegrass	ACTH7	*Achnatherum thurberianum*	1–7	–
	bluebunch wheatgrass	PSSPS	*Pseudoroegneria spicata ssp. spicata*	1–7	–
Forb					
3	**Perennial**			9–31	
	milkvetch	ASTRA	*Astragalus*	2–7	–
	buckwheat	ERIOG	*Eriogonum*	1–7	–
	skeletonplant	LYGOD	*Lygodesmia*	2–7	–
	spiny phlox	PHHO	*Phlox hoodii*	1–7	–
Shrub/Vine					
4	**Primary Shrubs**			83–123	
	little sagebrush	ARARL3	*Artemisia arbuscula ssp. longicaulis*	67–90	–
	Nevada jointfir	EPNE	*Ephedra nevadensis*	11–22	–

	purple sage	SADOI	*Salvia dorrii ssp. dorrii var. incana*	4–11	–
5	**Secondary Shrubs**			11–34	
	shadscale saltbush	ATCO	*Atriplex confertifolia*	2–7	–
	yellow rabbitbrush	CHVI8	*Chrysothamnus viscidiflorus*	2–7	–
	buckwheat	ERIOG	*Eriogonum*	2–7	–
	littleleaf horsebrush	TEGL	*Tetradymia glabrata*	2–7	–
Tree					
6	**Evergreen**			4–18	
	Utah juniper	JUOS	*Juniperus osteosperma*	4–18	–

Animal community

Livestock Interpretations:
This site has limited value for livestock grazing, due to the low forage production and steep slopes. Little information is available concerning livestock utilization of Salmon wildrye, though it is utilized by domestic sheep and presumably other grazing animals. Salmon wildrye provides a moderate amount of fair quality, coarse forage during the growing season, but is unpalatable when mature and dried. Palatability has been rated poor to good for sheep and fair to good for cattle and horses. 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. Sandberg 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. Lahontan sagebrush is considered a valuable browse plant during the spring, fall and winter months. In some areas it is of little value in winter due to heavy snow. Nevada ephedra is important winter range browse for domestic cattle, sheep and goats. Purple sage has low to medium platability for livestock. Utah juniper is used by and livestock for cover and food.

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:
Utah juniper is used by many birds and wildlife for cover and food. The foliage is grazed by mule deer when other foliage is scarce and during periods of deep snow. Juniper

"berries" or berry-cones are eaten by jackrabbits and coyotes. Many bird species depend on juniper berry-cones for fall and winter food. Lahontan sagebrush is considered a valuable browse plant during the spring, fall and winter months. In some areas it is of little value in winter due to heavy snow. Mule deer utilize and sometimes prefer Lahontan sagebrush, particularly in winter and early spring. 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. Mule deer, bighorn sheep, and pronghorn browse Nevada ephedra, especially in spring and late summer when new growth is available. Purple sage has low to medium platability for wildlife. Little information is available concerning wildlife utilization of Salmon wildrye. Salmon wildrye cover value has been rated poor to fair for mule deer, poor to good for upland game birds, and fair to good for small nongame birds and small mammals. Bottlebrush squirreltail is a dietary component of several wildlife species. Sandberg bluegrass is desirable for pronghorn antelope and mule deer in the spring and preferable in the spring, summer, and fall for elk and desirable as part of their winter range.

Hydrological functions

Runoff is very high. Permeability is moderate.

Recreational uses

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

Other products

Native Americans used Nevada ephedra as a tea to treat stomach and kidney ailments.

Other information

Nevada ephedra is useful for erosion control, and seedlings have been successfully planted onto reclaimed strip mines, with survival ranging from 12 to 94%. Atrazine may be effective in controlling Nevada ephedra, though some plants can survive through crown sprouting. Irrigation may increase control by atrazine. Bottlebrush squirreltail is tolerant of disturbance and is a suitable species for revegetation.

Type locality

Location 1: Humboldt County, NV	
General legal description	Jackson Mountains, Humboldt County, Nevada.

Other references

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

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

Great Basin Ecological Site Development Project: State and Transition Models for Major Land Resource Area 23, Nevada and portions of California (Online; https://naes.agnt.unr.edu/PMS/Pubs/2019-4060.pdf)

Contributors

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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)	
Contact for lead author	
Date	03/10/2026
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

2. **Presence of water flow patterns:**

3. **Number and height of erosional pedestals or terracettes:**

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

5. **Number of gullies and erosion associated with gullies:**

6. **Extent of wind scoured, blowouts and/or depositional areas:**

7. **Amount of litter movement (describe size and distance expected to travel):**

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

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:**

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):**

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:

Sub-dominant:

Other:

Additional:

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13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

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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:**

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17. **Perennial plant reproductive capability:**
