

Ecological site R029XY040NV LIMESTONE HILL

Last updated: 2/20/2025
Accessed: 02/24/2025

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 is 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 Limestone Hill site occurs on the summits and sideslopes of hills and lower mountains on all aspects. Slopes range from 8 to 75 percent, but slope gradients of 15 to 50 percent are typical. Elevations are 5000 to about 8800 feet. The soils are very shallow and well drained. These soils have formed in residuum and colluvium from limestone and dolomite. The soil profile is modified with 50 to 75 percent rock fragments and more than half of

these fragments are cobbles and stones. High amounts of rock fragments occur at the soil surface.

Associated sites

F029XY069NV	PIMO-JUOS WSG 0R0504 12 to 16 This site occurs on mountain and hill sideslopes, fan remnants and summits on all aspects. Slopes range from 2 to 75 percent, but typically are between 15 and 50 percent. Elevations are 5200 to about 9500 feet. The soils associated with this site are typically very shallow to very deep and are well drained. These soils are skeletal with 35 to 50 percent gravels, cobbles or stones, by volume, distributed throughout their profile. Available water capacity is very low, but trees and shrubs extend their roots into fractures in the bedrock allowing them to utilize deep moisture.
R029XY008NV	SHALLOW CALCAREOUS LOAM 8-12 P.Z. This site occurs on fan remnants, inset fans, and mountains on all exposures. Slopes range from 0 to 75 percent, but slope gradients of 4 to 30 percent are most typical. Elevations are 4200 to 8000 feet. The soils associated with this site are very shallow to very deep or they have a restrictive layer within the main rooting depth. These soils are moderately to strongly calcareous and soil reaction increases with soil depth. Some soils will accumulate variable concentrations of salts and sodium in their lower substratum. The soils are often modified with high amounts of gravels, cobbles or stones on the surface.
R029XY014NV	SHALLOW CALCAREOUS SLOPE 8-12 P.Z. 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. The available water capacity is very low to low.

Similar sites

R029XY014NV	SHALLOW CALCAREOUS SLOPE 8-12 P.Z. CEIN7 absent
R029XY151NV	SHALLOW LIMESTONE HILL CORA and PUST major shrubs
R029XY137NV	LIMESTONE RIDGE ACAR14 dominant grass; CEIN7 absent to rare
R029XY015NV	SHALLOW CALCAREOUS HILL 8-10 P.Z. PUST-JUOS major species; CEIN7 absent
R028BY066NV	LIMESTONE HILL ACSC11 dominant grass
R029XY008NV	SHALLOW CALCAREOUS LOAM 8-12 P.Z. CEIN7 absent

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Cercocarpus intricatus</i> (2) <i>Artemisia nova</i>
Herbaceous	(1) <i>Hesperostipa comata</i>

Physiographic features

The Limestone Hill site occurs on the summits and sideslopes of hills and lower mountains on all aspects. Slopes range from 8 to 75 percent, but slope gradients of 15 to 50 percent are typical. Elevations are 5000 to about 8800 feet.

Table 2. Representative physiographic features

Landforms	(1) Mountain (2) Hill
Runoff class	Very high
Elevation	5,000–8,800 ft
Slope	8–75%
Water table depth	72 in
Aspect	Aspect is not a significant factor

Climatic features

The climate associated with this site is arid, characterized by cool, moist winters and hot, dry summers. Average annual precipitation is 8 to 12(14) inches. Mean annual air temperature is 48 to 52 degrees F. The average growing season is about 100 to 150 days. There is no climate station available for this site.

Table 3. Representative climatic features

Frost-free period (average)	150 days
Freeze-free period (average)	
Precipitation total (average)	12 in

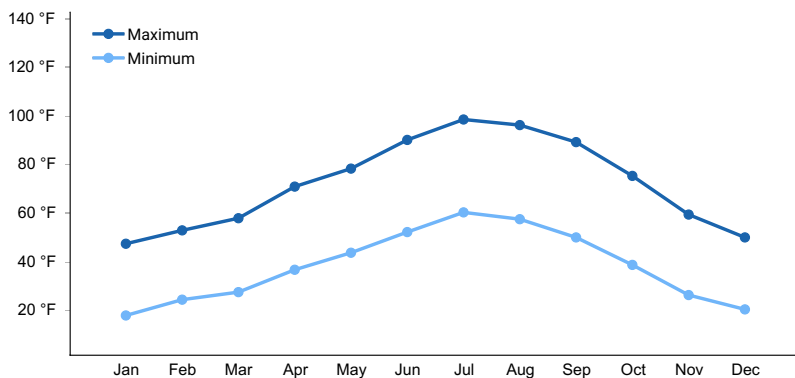


Figure 1. Monthly average minimum and maximum temperature

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils are very shallow and well drained. These soils have formed in residuum and colluvium from limestone and dolomite. The soil profile is modified with 50 to 75 percent rock fragments and more than half of these fragments are cobbles and stones. High amounts of rock fragments occur at the soil surface. Coarse fragments on the surface provide a stabilizing effect on surface erosion conditions. Runoff is very high, available water capacity is very low and water intake rates are moderate. The soil series associated with this site include: Eaglepass, a loamy-skeletal, carbonatic, mesic, Lithic Xeric Torriorthents.

Table 4. Representative soil features

Parent material	(1) Residuum–limestone (2) Colluvium–dolomite
Surface texture	(1) Extremely stony loam (2) Very cobbly loam (3) Extremely cobbly loam

Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderately rapid
Soil depth	4–6 in
Surface fragment cover ≤3"	16–50%
Surface fragment cover >3"	20–43%
Available water capacity (0–40in)	0.2–0.4 in
Calcium carbonate equivalent (0–40in)	15–30%
Electrical conductivity (0–40in)	0–2 mmhos/cm
Sodium adsorption ratio (0–40in)	0–5
Soil reaction (1:1 water) (0–40in)	7.9–9
Subsurface fragment volume ≤3" (Depth not specified)	22–60%
Subsurface fragment volume >3" (Depth not specified)	25–42%

Ecological dynamics

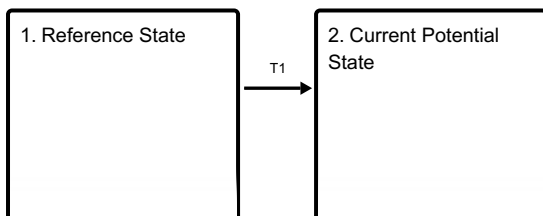
Where management results in abusive livestock use, needle and thread and Indian ricegrass decrease. Species such as cheatgrass are likely to invade this site.

Fire Ecology:

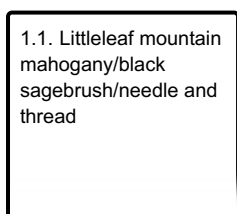
Littleleaf mountain mahogany is moderately damaged by fire and there is very little sprouting following fire. Littleleaf mountain mahogany occurs on harsh sites that are rarely burned by fire. Black sagebrush is highly susceptible to fire-caused mortality; plants are readily killed by all fire intensities. Following burning, reestablishment occurs through off-site sources. Needle and thread grass is top-killed by fire. It may be killed if the aboveground stems are completely consumed. Needle and thread grass is classified as slightly to severely damaged by fire. Needle and thread grass sprouts from the caudex following fire, if heat has not been sufficient to kill underground parts. Recovery usually takes 2 to 10 years. Indian ricegrass can be killed by fire, depending on severity and season of burn. Indian ricegrass reestablishes on burned sites through seed dispersed from adjacent unburned areas.

State and transition model

Ecosystem states



State 1 submodel, plant communities



State 2 submodel, plant communities

2.1. Littleleaf mountain mahogany/black sagebrush/needle and thread/non-native species

State 1 Reference State

The Reference State is representative of the natural range of variability under pristine conditions. The Reference State has one general community phases: a dominant tree/shrub phase. State dynamics are maintained by interactions between climatic patterns and disturbance regimes. Negative feedbacks enhance ecosystem resilience and contribute to the stability of the state. These include the presence of all structural and functional groups, low fine fuel loads, and retention of organic matter and nutrients. Plant community phase changes are primarily driven by fire, periodic drought and/or insect or disease attack.

Community 1.1 Littleleaf mountain mahogany/black sagebrush/needle and thread

The reference plant community is dominated by littleleaf mountain mahogany. Black sagebrush and needle and thread are important species associated with this site. Potential vegetative composition is about 15 percent grasses, 5 percent forbs and 80 percent shrubs and trees. Approximate ground cover (basal and crown) is 10 to 20 percent.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	230	340	452
Grass/Grasslike	45	68	90
Forb	15	23	30
Tree	10	19	28
Total	300	450	600

State 2 Current Potential State

The Current Potential State is similar to the Reference State with a similar community phase. Ecological function has not changed, however the resiliency of the state has been reduced by the presence of invasive weeds. Non-natives may increase in abundance but will not become dominant within this State. These non-natives can be highly flammable and can promote fire where historically fire had been infrequent. Negative feedbacks enhance ecosystem resilience and contribute to the stability of the state. These feedbacks include the presence of all structural and functional groups, low fine fuel loads, and retention of organic matter and nutrients. Positive feedbacks decrease ecosystem resilience and stability of the state. These include the non-natives' high seed output, persistent seed bank, rapid growth rate, ability to cross pollinate, and adaptations for seed dispersal.

Community 2.1 Littleleaf mountain mahogany/black sagebrush/needle and thread/non-native species

Community Phase 2.1 is characterized by mature littleleaf mountain mahogany trees. Black sagebrush is the dominant shrubs in the understory. Needle and thread is the dominant bunchgrass. There are small amounts of non-native species.

Transition T1

State 1 to 2

Introduction of non-native species. Any amount of introduced non-native species causes an immediate decrease in the resilience of the site. Annual non-native species cannot be easily removed from the system and have the potential to significantly alter disturbance regimes from their historic range of variation.

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			41–127	
	needle and thread	HECO26	<i>Hesperostipa comata</i>	23–68	–
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	9–23	–
	pine needlegrass	ACPI2	<i>Achnatherum pinetorum</i>	3–12	–
	desert needlegrass	ACSP12	<i>Achnatherum speciosum</i>	3–12	–
	Mormon needlegrass	ACAR14	<i>Achnatherum aridum</i>	3–12	–
2	Secondary Perennial Grasses			9–36	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	2–14	–
	squirreltail	ELEL5	<i>Elymus elymoides</i>	2–14	–
	James' galleta	PLJA	<i>Pleuraphis jamesii</i>	2–14	–
	muttongrass	POFE	<i>Poa fendleriana</i>	2–14	–
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	2–14	–
	beardless wheatgrass	PSSPI	<i>Pseudoroegneria spicata</i> ssp. <i>inermis</i>	2–14	–
Forb					
3	Perennial			9–36	
	blue grama	BOGR2	<i>Bouteloua gracilis</i>	2–14	–
4	Annual			0–14	
Shrub/Vine					
5	Primary Shrubs			303–420	
	littleleaf mountain mahogany	CEIN7	<i>Cercocarpus intricatus</i>	270–315	–
	black sagebrush	ARNO4	<i>Artemisia nova</i>	23–68	–
	spiny greasewood	GLSPA	<i>Glossopetalon spinescens</i> var. <i>aridum</i>	1–14	–
	Nevada jointfir	EPNE	<i>Ephedra nevadensis</i>	5–12	–
	mormon tea	EPVI	<i>Ephedra viridis</i>	4–11	–
6	Secondary Shrubs			20–60	
	fourwing saltbush	ATCA2	<i>Atriplex canescens</i>	5–14	–
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	5–14	–
	Stansbury cliffrose	PUST	<i>Purshia stansburiana</i>	5–14	–
	Joshua tree	YUBR	<i>Yucca brevifolia</i>	5–14	–
Tree					
7	Evergreen			5–14	
	Utah juniper	JUOS	<i>Juniperus osteosperma</i>	5–14	–
	singleleaf pinyon	PIMO	<i>Pinus monophylla</i>	5–14	–

Animal community

Livestock Interpretations:

This site is only marginally suitable to livestock grazing due to the steep slopes and low amounts of palatable forage. Grazing management should be keyed to perennial grass production. Needleandthread is important to livestock, especially in the spring before fruits have developed. Needlegrasses are grazed in the fall only if the fruits are softened by rain. Indian ricegrass is highly palatable to all classes of livestock in both green and cured

condition. It supplies a source of green feed before most other native grasses have produced much new growth. Cattle and sheep will feed on littleleaf mountainmahogany slightly in the winter, and is generally of minor significance to livestock. In winter, at lower elevations, black sagebrush is heavily utilized by domestic sheep.

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:

Littleleaf mountainmahogany is good winter browse for deer. Black sagebrush is a significant browse species within the Intermountain region. It is especially important on low elevation winter ranges in the southern Great Basin, where extended snow free periods allow animal's access to plants throughout most of the winter. In these areas it is heavily utilized by pronghorn and mule deer. Needleandthread is a moderately important spring forage for mule deer, but use declines considerably as more preferred forages become available. Indian ricegrass is an important forage for several wildlife species.

Hydrological functions

Runoff is very high and permeability is moderately rapid.

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

Indian ricegrass was traditionally eaten by some Native Americans. The Paiutes used seed as a reserve food source.

Other information

Black sagebrush is an excellent species to establish on sites where management objectives include restoration or improvement of domestic sheep, pronghorn, or mule deer winter range. Needleandthread grass is useful for stabilizing eroded or degraded sites.

Inventory data references

NASIS soil component data.

Type locality

Location 1: Nye County, NV	
Township/Range/Section	T8N R49E S15
General legal description	South end of Little Fish Lake Valley, Hot Creek Range, Nye County, Nevada. This site also occurs in Lincoln and Mineral Counties, Nevada.
Location 2: Esmeralda County, NV	
Township/Range/Section	T2N R34E S10
General legal description	Approximately 16 miles west of Coaldale Junction, about 3 miles north of USHwy 6, Candelaria Hills, Esmeralda County, Nevada.
Location 3: Esmeralda County, NV	
Township/Range/Section	T2N R35E S22

General legal description	About 9 miles west of Coaldale Junction, about along USHwy 6, Candelaria Hills, Esmeralda County, Nevada.
---------------------------	---

Other references

Fire Effects 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

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	07/12/2012
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. Rock fragments armor the surface.

2. **Presence of water flow patterns:** Water flow patterns are none to rare. Rock fragments armor the surface.

3. **Number and height of erosional pedestals or terracettes:** Pedestals are none to rare.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare Ground to 10-20%.

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 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):** Surface structure is typically moderately fine subangular blocky. Soil surface colors are browns and soils are typified by an ochric epipedon. Organic matter of the surface 2 to 3 inches is 1 to 3 percent.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Shrub canopy and associated litter break raindrop impact. Deep-rooted perennial grasses increase infiltration and reduce runoff.

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

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 tall shrubs (littleleaf mountain mahogany)

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

Other: 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 25% of total woody canopy; mature bunchgrasses commonly (<20%) have dead centers.

14. **Average percent litter cover (%) and depth (in):** Reference Plant Community: Under canopy and between plant interspaces 15-25% and depth <1/4-inch.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** For normal or average growing season \pm 450 lbs/ac. Favorable years \pm 600 lbs/ac and unfavorable years \pm 300 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 red-stem filaree.

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