

Ecological site R030XB001NV

LIMY HILL 5-7 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.

MLRA notes

Major Land Resource Area (MLRA): 030X–Mojave Basin and Range

This MLRA is in the Basin and Range Province of the Intermontane Plateaus. Most of the MLRA is in the Sonoran Desert Section of this province. The northern third is in the Great Basin Section, and the southeastern part is in the Mexican Highland Section. A small part of the southwest corner is in the Salton Trough Section. Broad basins, valleys, and old lakebeds make up most of the area, but widely spaced mountains trending north to south occur throughout the area. Isolated, short mountain ranges are separated by an aggraded desert plain. The mountains are fault blocks that have been tilted up. Long alluvial fans coalesce with dry lakebeds between some of the ranges. Elevation ranges from 282 feet (85 meters) below sea level, the lowest elevation occurring on dry land in the world, in Badwater Basin in Death Valley to 3,950 feet (1,205 meters) above sea level in valleys and basins. Some mountain ranges have peaks that exceed 11,100 feet (3,385 meters). The 30XB Land Resource Unit is found across the eastern half of California, much of the lower and mid-elevations of Nevada, the southernmost portions of western Utah, and the mid-elevations of northwestern Arizona. Elevations range from 1800 to 5000 feet and precipitation ranges from 4 to 9 inches per year, but is generally between 5 to 6 inches. This LRU is characterized primarily by summer precipitation. Summer precipitation falls between July and September in the form of rain, and winter precipitation falls starting in November and ends between February and March, also mostly in the form of rain; however, it does receive between 0 and 3 inches of snow, with an average of 1 inch. The soil temperature regime is thermic and the soil moisture regime is typic-aridic. Vegetation includes creosotebush, white bursage, Mormon tea, ratany, Mojave yucca, Joshua tree, cholla, cactus, big galleta and several other warm season grasses. At the upper elevations, plant production and diversity are greater and blackbrush is common.

Ecological site concept

This site occurs on hills and lower mountain sideslopes on all exposures. Slopes range from 8 to 75 percent, but slope gradients of 15 to 50 percent are most typical. Elevations are 1500 to about 4500 feet. The soils associated with this site are typically very shallow to shallow, and are derived from mixed parent material. The soils are typically calcareous to the surface. This site is part of group concept R030XB056NV.

Associated sites

R030XB005NV	Arid Active Alluvial Fans
R030XB017NV	LIMY HILL 3-5 P.Z.
R030XB030NV	SHALLOW LIMESTONE SLOPE 5-7 P.Z.
R030XB077NV	STEEP SOUTH SLOPE

Similar sites

R030XB072NV	STONY SLOPE 5-7 P.Z. ERFAP-EPHED codominant shrubs; AMDU2 minor spp.
R030XB073NV	VOLCANIC SLOPE 5-7 P.Z. ERFAP-KRPA-ENFR codominant shrubs with AMDU2
R030XB005NV	Arid Active Alluvial Fans Not on hill landform; less shrub diversity
R030XB070NV	VOLCANIC HILL 5-7 P.Z. ERFAP-AMDU2 codominant shrubs
R030XB077NV	STEEP SOUTH SLOPE ENFA dominant shrub
R030XB017NV	LIMY HILL 3-5 P.Z. Less productive site; LATR2 dominant shrub
R030XB071NV	VOLCANIC SLOPE 7-9 P.Z. ENCEL-AMDU2 codominant shrubs

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) <i>Ambrosia dumosa</i> (2) <i>Larrea tridentata</i>
Herbaceous	(1) <i>Pleuraphis rigida</i>

Physiographic features

This site occurs on hills and lower mountain sideslopes on all exposures. Slopes range from 8 to 75 percent, but slope gradients of 15 to 50 percent are most typical. Elevations are 1500 to about 4500 feet.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Mountain slope
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Flooding frequency	None
Ponding frequency	None
Elevation	460 – 1,370 m
Slope	10 – 80 %
Aspect	Aspect is not a significant factor

Climatic features

The climate of the Mojave Desert has extreme fluctuations of daily temperatures, strong seasonal winds, and clear skies. The climate is arid and is characterized with cool, moist winters and hot, dry summers. Most of the rainfall falls between November and April. Summer convection storms from July to September may contribute up to 25 percent of the annual precipitation. Average annual precipitation is 5 to 7 inches. Mean annual air temperature is 60 to 68 degrees F. The average growing season is about 180 to 290 days.

Table 3 Representative climatic features

Frost-free period (average)	290 days
Freeze-free period (average)	
Precipitation total (average)	180 mm

Influencing water features

There are no influencing water features associated with this site.

Soil features

The soils associated with this site are typically very shallow to shallow, and are derived from mixed parent material. The soils are typically calcareous to the surface. The surface is armored with high amounts of gravel, cobbles, or stones. The water intake rate is slow to very rapid and available water capacity is very low. Runoff is low to very high and these soils are well drained to excessively drained. Soil series associated with this site include: Akela, Azureridge, Bobzbulz, Cheme, Chinkle, Cololag, Corbilt, Far, Crosgrain, Garr, Haleburu, Heleweise, Hiddensur, Hiller, Huevi, Nickel, Nipton, St. Thomas, Sunrock, Teebar, and Upperline.

Table 4. Representative soil features

Surface texture	(1) Very gravelly fine sandy loam (2) Extremely gravelly sandy loam (3) Extremely stony loam
Family particle size	(1) Loamy

Drainage class	Well drained to excessively drained
Permeability class	Slow to very rapid
Soil depth	10 – 50 cm
Surface fragment cover <=3"	30 – 80 %
Surface fragment cover >3"	10 – 40 %
Available water capacity (0-101.6cm)	0.51 – 7.37 cm
Calcium carbonate equivalent (0-101.6cm)	10 – 50 %
Electrical conductivity (0-101.6cm)	0 – 10 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0 – 10
Soil reaction (1:1 water) (0-101.6cm)	7.4 – 9.6
Subsurface fragment volume <=3" (Depth not specified)	0 – 70 %
Subsurface fragment volume >3" (Depth not specified)	0 – 30 %

Ecological dynamics

The white bursage-creosotebush plant assemblage is extensive throughout the Mojave Desert and consists of both long-lived and short-lived perennial species. Surface disturbance on this site may reduce plant cover, density and diversity and increase erosion. These changes can be very subtle or extremely obvious depending on the intensity of use, rate of use and an assortment of environmental factors, such as topography, rainfall and soil type.

Vegetative cover is sparse across this ecological site. Patches of vegetation lead to greater water storage as well as increased organic carbon and nutrient inputs (Puidefabregas 2005). Patches of vegetation in semiarid ecosystems trap significantly higher amounts of runoff water as run-on (Ludwig et al. 2005). Run-on moisture enhances plant growth pulses. Depth of wetting increases under patches of

vegetation contributing to overall greater biomass production.

White bursage and creosotebush occur together throughout the successional process, although their relative percentages may change (Marshall 1994). White bursage commonly occurs in open spaces away from other plants. Once established it serves as a nurse plant for creosotebush and other associated species. White bursage is a common colonizer of disturbed areas in the Mojave Desert. It is assumed that creosotebush-white bursage communities are adapted to relatively light disturbances, such as lightly shifting sand surfaces (Marshall 1994). Creosotebush is capable of sprouting from the root crown following disturbance. In stable, old communities, creosotebushes or clones may attain ages of several thousand years. Defoliation and death of branches of creosotebush may occur as a result of long periods of intense moisture stress (Marshall 1995).

White bursage leafs out in early spring and flowers in early summer. Seeds typically germinate following heavy September precipitation (Marshall 1994). White bursage has a dormancy period in the summer and may have a freeze induced dormancy period in the winter if temperatures drop enough to kill its leaves (Marshall 1994). Creosotebush leafs out in response to spring, summer or fall rains and usually flowers in May. Age distribution of creosotebush communities indicated that germination and survival is rare. Summer rains have been correlated to successful sexual reproduction and flower success of creosotebush is greatest with moderate rainfall (Marshall 1995). Destructive impacts such as land clearing can reduce long-lived creosotebush. The opportunistic perennials such as rayless goldenhead, white burrobush, and wire lettuce will increase. With a loss of perennial cover, non-native annual grasses and forbs such as red brome, Mediterranean grass, and redstem filaree will readily invade this site.

Fire Ecology:

Pre-settlement fire regimes in Mojave Desert shrub communities are characterized by relatively infrequent, stand-replacement fires with return intervals in the range of 35 years to several centuries. Mojave Desert communities are usually unaffected by fire because of low fuel loads, although a year of exceptionally heavy winter rains can generate fuels by producing a heavy stand of annual forbs and grasses. When fires do occur, the effect on the ecosystem may be extreme due to the harsh environment and the slow rate of recovery. The loss of native vegetation can be followed by invasion of non-native annual forbs and grasses. The invasion of non-native annuals provides a continuous bed of fine fuels, promoting fires where they have historically been rare and decreasing the spatial variability of fire. White bursage and creosotebush possess limited sprouting ability, thus can be killed by fire. White bursage, however, can rapidly re-establish from off-site seed. Range ratany resprouts from the crown after fire. Damage to big galleta from fire varies. If big galleta is dry, damage may be severe. However, when plants are green, fire will tend to be less severe and damage may be minimal, with big galleta recovering quickly.

State and transition model

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
Grass/Grasslike					
1	Primary Perennial Grasses			1-37	
	big galleta	PLRI3	<i>Pleuraphis rigida</i>	1-22	–
	low woollygrass	DAPU7	<i>Dasyochloa pulchella</i>	0-15	–
2	Secondary Perennial Grasses			1-15	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	1-9	–
	desert needlegrass	ACSP12	<i>Achnatherum speciosum</i>	1-9	–
	threeawn	ARIST	<i>Aristida</i>	1-9	–
3	Annual			1-15	
Forb					
4	Perennial			3-22	
	globemallow	SPHAE	<i>Sphaeralcea</i>	0-2	–
5	Annual			1-43	
	plantain	PLANT	<i>Plantago</i>	1-9	–
Shrub/Vine					
6	Primary Shrubs			164-270	
	burrobush	AMDU2	<i>Ambrosia dumosa</i>	140-168	–
	creosote bush	LATR2	<i>Larrea tridentata</i>	15-56	–
	littleleaf ratany	KRER	<i>Krameria erecta</i>	6-22	–
	desert pepperweed	LEFR2	<i>Lepidium fremontii</i>	1-15	–

	Fremont's dalea	PSFRF	<i>Psorothamnus fremontii</i> var. <i>fremontii</i>	3-9	–
7	Secondary shrubs			28-71	
	Fremont's chaffbush	AMFR2	<i>Amphipappus fremontii</i>	0-9	–
	shadscale saltbush	ATCO	<i>Atriplex confertifolia</i>	0-9	–
	Engelmann's hedgehog cactus	ECEN	<i>Echinocereus engelmannii</i>	0-9	–
	brittlebush	ENFA	<i>Encelia farinosa</i>	0-9	–
	Virgin River brittlebush	ENVI	<i>Encelia virginensis</i>	0-9	–
	jointfir	EPHED	<i>Ephedra</i>	0-9	–
	Eastern Mojave buckwheat	ERFAP	<i>Eriogonum fasciculatum</i> var. <i>polifolium</i>	0-9	–
	California barrel cactus	FECYC	<i>Ferocactus cylindraceus</i> var. <i>cylindraceus</i>	0-9	–
	beavertail pricklypear	OPBA2	<i>Opuntia basilaris</i>	0-9	–
	Mojave woodyaster	XYTO2	<i>Xylorhiza tortifolia</i>	0-9	–
	Mojave yucca	YUSC2	<i>Yucca schidigera</i>	0-9	–
	woody crinklemat	TICA3	<i>Tiquilia canescens</i>	0-6	–
	Parish's goldeneye	VIPA14	<i>Viguiera parishii</i>	0-6	–

Table 6. Community 1.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 7. Community 2.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 8. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 9. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Table 10. Community 3.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production ()	Foliar Cover (%)
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Animal community

Livestock Interpretations: This site is suitable for spring grazing by sheep and cattle where water is available. White bursage is an important browse species. Browsing pressure on white bursage is particularly heavy during years of low precipitation, when production of winter annuals is low. White bursage is of intermediate forage value. It is fair to good forage for horses and fair to poor for cattle and sheep. However, because there is often little other forage where white bursage grows, it is often highly valuable to browsing animals. Many animals bed in or under creosotebush. Domestic sheep dig shallow beds under creosotebush because it provides the only shade in the desert scrub community. Creosotebush is unpalatable to livestock. Consumption of creosotebush may be fatal to sheep. Big galleta is considered a valuable forage plant for cattle and domestic sheep. Its coarse, rigid culms make it relatively resistant to heavy grazing and trampling. 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: Many small mammals browse creosotebush or consume its seeds. Desert reptiles and amphibians use creosotebush as a food source and perch site and hibernate or estivate in burrows under creosotebush, avoiding predators and excessive daytime temperatures. White bursage is an important browse species for wildlife.

Hydrological functions

Runoff is very high and permeability is moderate to moderately rapid. Water flow patterns and rills are none to rare. Pedestals and terracettes are none. Gullies are rare to none. Sparse shrub canopy and associated litter break raindrop impact and aid in infiltration.

Recreational uses

Aesthetic value is derived from the diverse floral and faunal composition and the colorful flowering of wildflowers and shrubs during the spring and early summer. This site offers rewarding opportunities for photographers and for nature study.

Other products

White bursage is a host for sandfood, a parasitic plant with a sweet, succulent, subterranean flowerstalk. Sandfood was a valuable food supply for desert peoples. Creosotebush has been highly valued for its medicinal properties by desert peoples. It has been used to treat at least 14 illnesses. Twigs and leaves may be boiled as tea, steamed, pounded into a powder, pressed into a poultice, or heated into an infusion.

Other information

White bursage and creosotebush may be used to rehabilitate disturbed environments in southwestern deserts. Once established, creosotebush and white bursage may improve sites for annuals and other perennials that grow under their canopies by trapping fine soil, organic matter, and symbiont propagules. Water infiltration and storage may also increase.

Inventory data references

NV-ECS-1: 3 records

Type locality

Location 1: Clark County, NV	
Township/Range/Section	T26 R58 S25
General legal description	MDBM. Clark County, Nevada. Section 25 and 26
Location 2: Clark County, NV	
Township/Range/Section	T23 R63 S21
General legal description	Lower mountain sideslopes northwest of Eldorado Valley, McCullough Range, Clark County, Nevada.

Other references

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

Ludwig, J.A., B.P. Wilcox, D.D. Breshears, D. J. Tongway and A.C. Imeson. 2005. Vegetation patches and runoff-erosion and interacting ecohydrological processes in semiarid landscapes. *Ecology*. 86(2): 288-297.

Marshall, K.A. 1994. *Ambrosia dumosa*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer).

Available: <http://www.fs.fed.us/database/feis/>

Marshall, K.A. 1995. *Larrea tridentata*. In: Fire Effects Information System, [Online].

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

Contributors

Approval

Kendra Moseley, 2/18/2025

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	07/14/2009
Approved by	
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** Rills are none. Rock fragments armor the soil surface against erosion.

2. **Presence of water flow patterns:** Water flow patterns are none to rare. A few may on steeper slopes (short <1m) after summer convection storms.

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

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**
Bare ground is variable (15-25%), depending on amount of surface rock fragments.

5. **Number of gullies and erosion associated with gullies:** None. Natural drainages may be observed on steeper side slopes.

6. Extent of wind scoured, blowouts and/or depositional areas: None

7. Amount of litter movement (describe size and distance expected to travel): Litter typically remains in place. Fine litter (foliage from grasses and annual and perennial forbs) may move the distance of slope length (<10 ft) during intense summer convection storms or rapid snowmelt events. Persistent litter (large woody material) will remain in place expect 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 depending on soil textures and canopy cover. (To be field tested.)

9. Soil surface structure and SOM content (include type of structure and A-horizon color and thickness): Soil surface structure is typically weak thin to medium platy. Soil surface colors are light and the soils have an ochric epipedon. Organic matter of the surface 2 to 3 inches is less than 1 percent.

10. Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff: Sparse shrub canopy (10-15%) and associated litter provide some protection from raindrop impact.

11. Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site): None. Subangular blocky structure, calcic or petrocalcic 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: white bursage > creosotebush > associated desert shrubs >

Sub-dominant: warm-season perennial grasses > perennial forbs > annual forbs > cool-season perennial grasses

Other: succulents, microbiotic crusts

Additional:

13. Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence): Dead branches within individual shrubs are common and standing dead shrub canopy material may be as much as 25% of total woody canopy.

14. Average percent litter cover (%) and depth (in): Between plant interspaces 5-15% and depth of litter is $\pm\frac{1}{4}$ inch. Litter is concentrated under shrubs and generally stays in place.

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**
For normal or average growing season ~250 lbs/ac. Favorable years ± 350 lbs/ac and unfavorable years ± 100 lbs/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: Red brome, red-stem filaree, mustards, and Mediterranean grass are potential invaders on this site.
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17. **Perennial plant reproductive capability:** All functional groups should reproduce in average and above-average rainfall years. Little growth and reproduction occurs during extreme drought and extended drought periods.
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