Ecological site R030XB158CA
Ballena Summit

Last updated: 2/25/2025
Accessed: 05/12/2025

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.

Ecological site concept

This site occurs on rolling fan remnants and ballenas. Soils are very deep and formed in older alluvium derived from limestone sources.

Associated sites

R030XB159CA	**Broad Gravelly Wash** Occurs in drainageways. The dominant species are Virgin River brittlebush (Encelia virginensis) and catclaw acacia (Acacia greggii).

Similar sites

R030XA006NV	**SHALLOW LIMESTONE SLOPE 5-7 P.Z.** This ecosite has a higher abundance of blackbrush and a lower abundance of white bursage. Rainfall falls mostly in the winter (XA).

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Coleogyne ramosissima* (2) *Ambrosia dumosa*
Herbaceous	Not specified

Physiographic features

This site occurs on rolling fan remnants and ballenas.

Table 2. Representative physiographic features

Landforms	(1) Fan remnant (2) Ballena
Flooding duration	Brief (2 to 7 days) to very brief (4 to 48 hours)
Flooding frequency	None to rare
Ponding duration	Very brief (4 to 48 hours) to brief (2 to 7 days)
Ponding frequency	None to rare
Elevation	3,400–4,400 ft
Slope	2–40%
Ponding depth	0–1 in

Water table depth	60 in
Aspect	Aspect is not a significant factor

Climatic features

The Mojave Desert experiences clear, dry conditions for a majority of the year. Winter temperatures are mild, summer temperatures are hot, and seasonal and diurnal temperature fluctuations are large. Monthly minimum temperature averages range from 30 to 80 degrees F (-1 to 27 degrees C). Monthly maximum temperature averages range from 60 to 110 degrees F (16 to 43 degrees C) (CSU 2002).

Average annual rainfall is between 2 and 8 inches (50 to 205 millimeters) (USDA 2006). Snowfall is more common at elevations above 4000 feet (1220 meters), but it may not occur every year (WRCC 2002b). The Mojave Desert receives precipitation from two sources. Precipitation falls primarily in the winter as a result of storms originating in the northern Pacific Ocean. The Sierra Nevada and Transverse Ranges create a rain shadow effect, causing little precipitation to reach the Mojave Desert. Sporadic rainfall occurs during the summer as a result of convection storms formed when moisture from the Gulf of Mexico or Gulf of California moves into the region. Summer rainfall is more common and has a greater influence on soil moisture in the eastern Mojave Desert.

Windy conditions are also common in the Mojave Desert, particularly in the west and central Mojave Desert. Spring is typically the windiest season, with winds averaging 10-15 miles per hour (WRCC 2002a). Winds in excess of 25 miles per hour and gusts in excess of 50 miles per hour are not uncommon (CSU 2002).

In the BLM Grazing Allotments Soil Survey (Northeast Part of Mojave Desert Area, CA (CA805)), most areas receive approximately 5 to 7 inches of precipitation annually (WRCC 2002b). At elevations above 4000 feet (1370 meters), average annual precipitation in the form of rain may reach 8 inches or more, and average annual snowfall may reach up to 10 inches (WRCC 2002b).

The data from the following climate stations were used to describe the climate in the BLM Grazing Allotments Soil Survey (station number in parentheses):
Pahrump, NV (265890)
Mountain Pass, CA (045890)
Searchlight, NV (267369)
Red Rock Canyon State Park, NV (266691)

Due to the range of elevation at which this ecosite occurs, precipitation and temperature averages represent data from two weather stations.

"Maximum monthly precipitation" represents average monthly precipitation at Mountain Pass, CA (high elevation).

"Minimum monthly precipitation" represents average monthly precipitation at Pahrump, NV (low elevation).

Maximum and minimum temperatures are from Pahrump, NV. Average high temperatures at Mountain Pass are approximately 8-10 degrees cooler than at Pahrump, NV. Average low temperatures at Mountain Pass are within 3-5 degrees of average low temperatures at Pahrump.

Table 3. Representative climatic features

Frost-free period (average)	280 days
Freeze-free period (average)	271 days
Precipitation total (average)	7 in

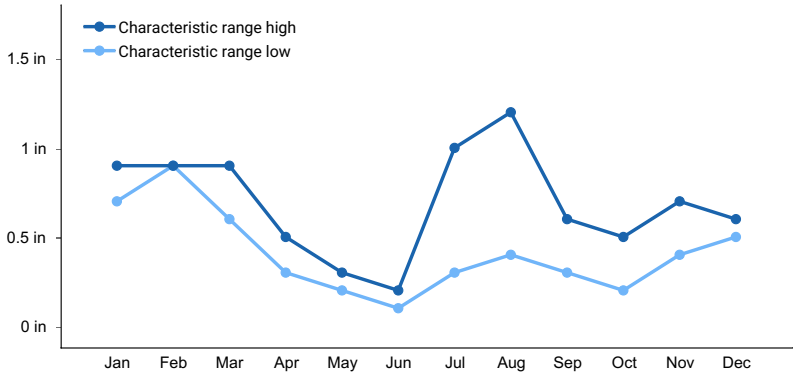


Figure 1. Monthly precipitation range

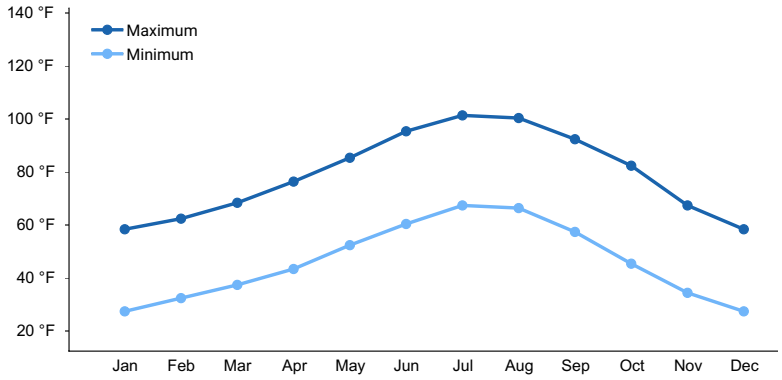


Figure 2. Monthly average minimum and maximum temperature

Influencing water features

Soil features

The soils on this ecosite are very stable. They are very deep and formed in older alluvium derived from limestone sources. Since fan remnants are a stable landform, a well-developed horizon rich in calcium carbonate exists in these soils. They classify as Typic Haplocalcids, and are well drained and moderately permeable. Runoff is low, and the soils rarely experience ponding. The soils on this ecosite have a thermic (warm) soil temperature regime but are in a transition to a mesic (cool) soil temperature regime. This transition is reflected in the vegetation present on this site where blackbrush (Coleogyne ramossisima) increases on cooler soils, and white bursage (*Ambrosia dumosa*) increases on warmer soils.

Soil survey area - Map unit symbol - Component
CA805 - 3660 - Weizer, cool (minor component)
CA805 - 4190 - Weizer, cool (minor component)
CA805 - 4190 - Weizer, steep (minor component)

Table 4. Representative soil features

Surface texture	(1) Gravelly loam
Family particle size	(1) Loamy
Drainage class	Moderately well drained to well drained
Permeability class	Moderately slow to moderate
Soil depth	60–80 in
Surface fragment cover <=3"	30–90%
Surface fragment cover >3"	3–20%
Available water capacity (0-40in)	0.5–2 in

Calcium carbonate equivalent (0-40in)	30–47%
Electrical conductivity (0-40in)	0–2 mmhos/cm
Sodium adsorption ratio (0-40in)	0–5
Soil reaction (1:1 water) (0-40in)	8.2–8.6
Subsurface fragment volume <=3" (Depth not specified)	15–80%
Subsurface fragment volume >3" (Depth not specified)	1–20%

Ecological dynamics

Please refer to group concept R030XB029NV to view the provisional STM.

Blackbrush (*Coleogyne ramosissima*) and white bursage (*Ambrosia dumosa*) are co-dominant species on this ecosite. The relative abundance of each species shifts along an elevational gradient, and it follows a transition in the soil temperature regimes (STR) on this ecosite. Blackbrush is typically the more dominant species at higher elevations on cooler soils (i.e. cool thermic and/or mesic STR). White bursage becomes the more dominant species at lower elevations on warmer soils (i.e. thermic STR).

Blackbrush is a late seral species (Anderson 2001). White bursage's seeding ability allows it to colonize disturbed sites, but it is frequently found with late seral species such as blackbrush and creosotebush (*Larrea tridentata*) (Marshall 1994).

Wildfire may affect this ecosite. Historically, wildfire frequency in the Mojave Desert was low. Widely spaced shrubs and discontinuous fuels prevented fires from spreading easily. Spread of invasive annual species in the Mojave Desert creates a more continuous and easily ignitable fuel bed, particularly after heavy rains, and increases the fire frequency and the size of the area disturbed (Clarke 2006, Howard 2006). Invasive annual plants such as red brome (*Bromus rubens*) often re-colonize these disturbed sites (Brooks et al. 2003). Red brome is currently present in small amounts on this ecosite. Its spread would increase the risk and frequency of fire on this ecosite.

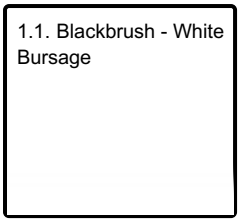
Following a wildfire, the blackbrush-white bursage community is likely to be significantly altered. Cover of both shrubs will decline. Blackbrush foliage is thought to be extremely flammable (Anderson 2001), and fires in blackbrush communities were often stand-replacing (Brooks et al. 2003). Blackbrush does not resprout after fire and is very slow to reinvade a site, but historical fire return intervals of more than 100 years allowed for slow re-establishment (Anderson 2001). White bursage is generally killed by fire, and its ability to resprout is low. If a source is available, white bursage can re-establish on a site through seed (Marshall 1994). Shadscale can also re-establish via seed. Several species on this ecosite will typically resprout following a wildfire. These include Ephedra spp. and Yucca spp. Annual grasses such as red brome (*Bromus rubens*) and shrubs such as rayless goldenhead (*Acamptopappus sphaerocephalus*) and burrobush (*Hymenoclea salsola*) may also become more common.

State and transition model

Ecosystem states

1. Blackbrush - White Bursage

State 1 submodel, plant communities



State 1
Blackbrush - White Bursage

Community 1.1
Blackbrush - White Bursage

The interpretive plant community is the reference plant community prior to European colonization. This site occurs on very stable fan remnants and ballenas and is dominated by blackbrush and white bursage. Other major species on this ecosite are shadscale (*Atriplex confertifolia*), Mojave yucca (*Yucca schidigera*) and creosotebush (*Larrea tridentata*). “Percent Composition by Frequency of Overstory Species” represents only low, RV, and high canopy cover. Production values are not listed.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Shrub/Vine	144	240	286
Grass/Grasslike	4	6	8
Forb	2	4	6
Total	**150**	**250**	**300**

Table 6. Soil surface cover

Tree basal cover	0%
Shrub/vine/liana basal cover	2-6%
Grass/grasslike basal cover	0-2%
Forb basal cover	0-2%
Non-vascular plants	0%
Biological crusts	0%
Litter	1-4%
Surface fragments >0.25" and <=3"	60-87%
Surface fragments >3"	1-4%
Bedrock	0%
Water	0%
Bare ground	0-2%

Table 7. Canopy structure (% cover)

Height Above Ground (Ft)	Tree	Shrub/Vine	Grass/ Grasslike	Forb
<0.5	–	10-15%	1-2%	1-3%
>0.5 <= 1	–	10-15%	–	–
>1 <= 2	–	20-50%	–	–
>2 <= 4.5	–	10-15%	–	–
>4.5 <= 13	–	–	–	–
>13 <= 40	–	–	–	–
>40 <= 80	–	–	–	–
>80 <= 120	–	–	–	–
>120	–	–	–	–

Additional community tables

Table 8. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Shrub/Vine					
1	**Perennial Shrubs**			144–286	
	burrobush	AMDU2	*Ambrosia dumosa*	30–70	–
	blackbrush	CORA	*Coleogyne ramosissima*	30–60	–
	shadscale saltbush	ATCO	*Atriplex confertifolia*	25–45	–
	creosote bush	LATR2	*Larrea tridentata*	15–30	–
	spiny menodora	MESP2	*Menodora spinescens*	10–18	–
	Death Valley jointfir	EPFU	*Ephedra funerea*	7–15	–
	Mojave yucca	YUSC2	*Yucca schidigera*	8–15	–
	water jacket	LYAN	*Lycium andersonii*	3–6	–
	cottontop cactus	ECPO2	*Echinocactus polycephalus*	2–3	–
	littleleaf ratany	KRER	*Krameria erecta*	2–3	–
	desert pepperweed	LEFR2	*Lepidium fremontii*	2–3	–
	Mojave woodyaster	XYTO2	*Xylorhiza tortifolia*	2–3	–
	Engelmann's hedgehog cactus	ECEN	*Echinocereus engelmannii*	2–3	–
	rayless goldenhead	ACSP	*Acamptopappus sphaerocephalus*	1–3	–
Grass/Grasslike					
2	**Perennial Grasses**			4–8	
	low woollygrass	DAPU7	*Dasyochloa pulchella*	2–4	–
	big galleta	PLRI3	*Pleuraphis rigida*	2–4	–
Forb					
3	**Annual Forbs**			2–6	
	manybristle chinchweed	PEPA2	*Pectis papposa*	1–3	–
	desert Indianwheat	PLOV	*Plantago ovata*	1–3	–

Animal community

Blackbrush is an important browse species for bighorn sheep. Seeds of both species are consumed by small mammals and birds. Mature shrubs provide cover for small animals.

The desert tortoise (Gopherus agassizii) may be present in this ecosite. Desert tortoises typically occur in areas of gravelly or sandy to sandy loam soils (CDPR 1997). They often burrow under large desert shrubs or in the banks of washes, but may also be found on rocky slopes (DFG 2006). They occur where there is a variety of shrubs, grasses, and forbs. They are common in creosote bush-white bursage (*Larrea tridentata-Ambrosia dumosa*), shadscale (*Atriplex confertifolia*), and creosote-Joshua tree (*Larrea tridentata*-Yucca brevifolia) vegetation types (Smith 1989). They may also be found in blackbrush (Coleogyne ramossisima), cactus (Cactaceae), mesquite (Prosopis spp.), or acacia (Acacia spp.) communities (Snyder 1991). Their diet is mostly composed of grasses and forbs (Snyder 1991). Reduced food availability, as well as destruction of burrows, protective vegetation cover, or direct killing of tortoises, may result from activities such as grazing or disturbance from off-highway vehicles (Smith 1989).

The major land use of this ecosite is livestock grazing. Blackbrush and white bursage are important winter grazing species. They are of low to moderate forage value and are generally not preferred when grasses and other species are present (Anderson 2001, Marshall 1994). Both species will decline in cover as a result of uncontrolled use.

Recreational uses

This site is very scenic and offers many opportunities for photography.

Inventory data references

Vegetation cover was sampled in lieu of production due to a poor growing season. Ten 100-foot point-intercept transects were sampled on 29 March 2006 at the type locality. The top two tiers of vegetation or other cover class (e.g. bare soil, gravel, rock, litter, biological soil crust) were recorded at every foot.

Annual production numbers were estimated based on similar ecological sites.

Type locality

Location 1: San Bernardino County, CA	
UTM zone	N
UTM northing	3946835
UTM easting	638917
Latitude	35° 39′ 20″
Longitude	115° 27′ 55″
General legal description	Located about 1/4 mile south of State Line Pass.

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Contributors

Heath M. McAllister, Allison Tokunaga

Approval

Sarah Quistberg, 2/25/2025

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)	
Contact for lead author	
Date	05/12/2025

Approved by	Sarah Quistberg
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:**
