USDA Natural Resources
Conservation Service

Ecological site R030XC002CA
Shallow Loamy-Skeletal Ustic Low Slopes

Last updated: 2/25/2025
Accessed: 05/21/2025

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): 030X–Mojave Basin and Range

Major Land Resource Area: 030-Mojave Desert

MLRA Statement:
Major Land Resource Area (MLRA) 30, Mojave Desert, is found in southern California, southern Nevada, the extreme southwest corner of Utah and northwestern Arizona within the Basin and Range Province of the Intermontane Plateaus. The climate of the area is hot (primarily hyperthermic and thermic; however at higher elevations, generally above 5,000 feet, mesic, cryic and frigid) and dry (aridic). Elevations range from below sea level to over 12,000 feet in the higher mountain areas found within the MLRA. Due to the extreme elevational range found within this MLRA, land resource units (LRUs) were designated to group the MLRA into similar land units.

LRU Description:

This Land Resource Unit (designated by ‘XC’) is found primarily in Nevada at the higher elevations, but can also be found in the New York, Providence and Castle Mountains and Clark Mountain Range in California, as well as the Cerbat and Virgin Mountains of Arizona. Elevations range from 5000 to 12,000 feet and precipitation ranges 9 to 18 inches per year in the form of rain, and also receives 3 – 48 inches of precipitation in the form of snow. This LRU is characterized primarily by the mesic soil temperatures and aridic bordering on ustic soil moisture regimes. The precipitation ratio for this LRU is characterized by winter:summer being approximately 70:30. Summer precipitation falls between July and September in the form of rain, and winter precipitation falls starting in October and ends between February and March, mostly in the form of snow. Vegetation at

the lower elevations of this LRU includes blackbrush, Joshua tree, juniper, pinyon pine, and mountain big sagebrush. At the higher elevations, vegetation includes oaks, Mojave sagebrush, Ponderosa pine, white fir, limber pine and the Great Basin bristlecone pine.

Ecological site concept

This ecological site occurs on gently sloping rock pediments and low hills with undulating topography at elevations of approximately 5000 to 5200 feet. Soils are very shallow to shallow, well-drained loamy skeletal sandy loams with high run-off and moderate permeability. This ecological site consists of a relatively low production shrub community dominated by big sagebrush (Artemisisa tridentata) and desert bitterbrush (*Purshia glandulosa*). The mesic soil temperature regime and loamy soils support big sagebrush, while skeletal soils support desert bitterbrush, allowing the two species to co-dominate. Shallow soils support relatively low production, and do not support herbaceous species. Biological soil crusts are important in this site. The dissected pediment landscape with high runoff provides localized run-on which allows species requiring additional run-on to exist in this site.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Artemisia tridentata* (2) *Purshia glandulosa*
Herbaceous	(1) *Bouteloua barbata*

Physiographic features

This ecological site occurs on gently sloping pediments and low hills. Slopes range from 4 to 15 percent, and the topography is undulating. Elevations range from 5000 to 5200''. This site does not experience flooding, but runoff class is very high, which causes localized additional run-on in concave areas, which creates habitat for species such as California brickellbush and Utah juniper.

*Note, this site is being developed, the elevation range may change.

Table 2. Representative physiographic features

Landforms	(1) Pediment (2) Hill
Flooding frequency	None
Elevation	1,524–1,585 m
Slope	4–15%
Aspect	Aspect is not a significant factor

Climatic features

Influencing water features

Soil features

The soils associated with this ecological site are very shallow to shallow over granitic bedrock, and formed in residuum and colluvium derived from granitic rock. Surface textures are gravelly loams and gravelly sandy loams, and subsurface textures are very gravelly sandy loams, gravelly sandy loams, very gravelly loamy coarse sands, very gravelly sandy clay loams, and extremely gravelly loamy coarse sands. A weak argillic horizon occurs at approximately 1 inch below the surface to up to 14 inches below the surface. Weakly cemented paralithic bedrock occurs8 to 16 inches below the surface, and bedrock occurs at approximately 18 inches. These soils are well drained and moderately permeable. The soil temperature regime is mesic, and the soil moisture regime is typic aridic bordering on ustic. These soils are classified as Loamy-skeletal, mixed, superactive, mesic, shallow Ustic Haplargids. The soil series associated with this site is Cetrepas.

Table 3. Representative soil features

Parent material	(1) Colluvium–granite
Surface texture	(1) Gravelly loam (2) Silt
Family particle size	(1) Loamy
Drainage class	Well drained
Permeability class	Moderate
Soil depth	20–41 cm
Surface fragment cover <=3"	15–40%
Surface fragment cover >3"	5–10%
Subsurface fragment volume <=3" (Depth not specified)	30–65%
Subsurface fragment volume >3" (Depth not specified)	10–65%

Ecological dynamics

This ecological site occurs on moderately sloping, undulating low hills or rock pediment. Soils are very shallow to shallow, and have loamy skeletal textures. These soils are well drained with moderate permeability.

This ecological site is characterized by a relatively low producing shrub community dominated by big sagebrush (*Artemisia tridentata*) and desert bitterbrush (*Purshia glandulosa*). Loamy-skeletal soils allow these species to co-exist: big sagebrush is favored on loamy soils, while desert bitterbrush is favored on coarse soils (Nord, 1965). Shallow skeletal soils do not support high production, and do not support herbaceous species, which are minimal on this site. However, high summer precipitation will support an ephemeral flush of annual species such as sixweeks grama (*Bouteloua barbata*) and fringed amaranth (*Amaranthus fimbriatus*).

Biological soil crusts (BSC) including cyanobacterial crusts and blackened algal crusts are frequent on the grussy granite typical of soil surfaces on this ecological site. These crusts are important for improving soil stability, infiltration, and nutrient cycling on these shallow soils (Belnap et al. 2001). Biological soil crusts form slowly, and are very sensitive to physical disturbance (such as from livestock trampling or off-road vehicle disturbance).

The unduluating topography and high runoff characteristic of this site create localized run-on in concave areas, where species requiring additional moisture such as California brickellbush (Brickelia californica) or Utah juniper (Juniper osteosperma) may occur.

Disturbance dynamics:
Grazing and fire, interactions between the two, and interactions with climate are the dominant disturbance factors effecting this ecological site. Both big sagebrush and desert bitterbrush are tolerant of browse, and light to moderate grazing (Nord, 1965; Tueller and Tower, 1979; Bilborough and Rihads, 1993). Heavy grazing however, especially late in the growing season, can cause branch or whole plant mortality in both species (Nord, 1965; Bilborogh and Rihads, 1993). Desert bitterbrush is more tolerant of grazing than big sagebrush due to a more plastic ability to allocate resources (Bilbourough and Rihads, 1993), and heavily or seasonally inappropriate grazing will shift the dominance of this site to desert bitterbrush. Other less palatable species will increase in importance, including threadleaf snakeweed (*Gutierrezia microcephala*), narrowleaf goldenbush (*Ericameria linearifolia*), and banana Yucca (Yucca bacata). Total plant cover declines, biological soil crusts are destabilized, and this site is at risk for erosion. We do not have data, but with continued heavy grazing, or a high severity fire in this community phase put this community potentially at risk of transitioning to an eroded state.

Moderate to severe fire causes mortality of big sagebrush, and shifts the reference community to a community dominated by desert bitterbrush, which quickly resprouts following fire (Nord, 1965).

State and transition model

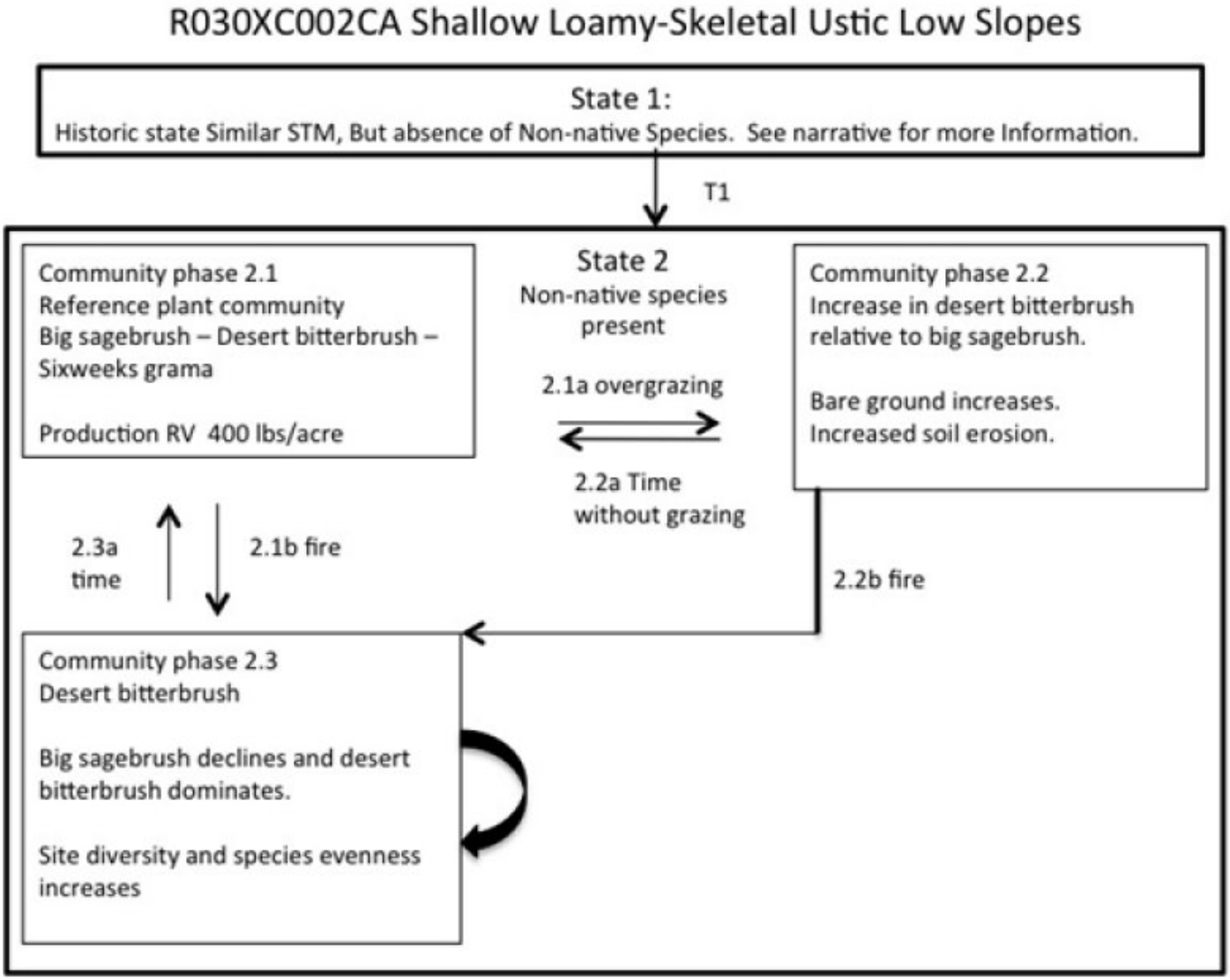

Figure 1. R030XC002CA

State 1
Historic State

State 2 represents the current range of variability for this site. Non-native annuals,

including red brome and cheatgrass are naturalized in this plant community. Their abundance varies with precipitation, but they are at least sparsely present (as current year's growth or present in the soil seedbank).

State 2
Reference State

State 1 represents the historic range of variability for this ecological site. This state no longer exists due to the ubiquitous naturalization of non-native species in the Mojave Desert. Periodic drought and very rare fire were the natural disturbances influencing this ecological site. Data for this State does not exist, but it would have been similar to State 2, except with only native species present. See State 2 narrative for more detailed information.

Community 2.1
Current potential plant community

We do not have data for the reference community in MOJA yet.

Community 2.2
Grazed

Figure 2. Community Phase 2.2

This community develops with heavy grazing. Big sagebrush declines in abundance, and desert bitterbrush, which is more tolerant of grazing than sagebrush (Bilborough and Rihads; Garrison, 1953; Cook and Stoddard, 1960; Shephard, 1971), is the dominant shrub. Species diversity and evenness increase. Less palatable shrubs such as such as snakeweed, narrowleaf goldenbush, and banana yucca increase. Bare ground increases, and the site is at risk of soil erosion. Continued heavy use of this community, especially late in the growing season could trigger a transition to an altered state.

Community 2.3
Burned

Figure 4. Community Phase 2.3

This community phase is dominated by desert bitterbrush, which resprouts quickly after fire (Nord, 1965). Big sagebrush is absent from the community. Other species capable of resprouting after fire are present, including Nevada jointfir, narrow-leaved goldenbush, banana yucca, purple sage and kingcup cactus. With time without fire, and if seed sources for big sagebrush are available, the reference plant community will regenerate. However, with repeat burning, the desert bitterbrush dominated community will persist. We do not have data for this community phase yet, but have observations and photographic evidence in the Midhills area, MOJA.

Additional community tables

Table 4. Community 2.2 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Shrub/Vine					
1	**Shrubs**			280–504	
	desert bitterbrush	PUGL2	*Purshia glandulosa*	146–258	7–12
	big sagebrush	ARTR2	*Artemisia tridentata*	45–90	2–6
	purple sage	SADO4	*Salvia dorrii*	0–67	0–10
	narrowleaf goldenbush	ERLI6	*Ericameria linearifolia*	0–67	0–10
	Nevada jointfir	EPNE	*Ephedra nevadensis*	146–39	0–6
	threadleaf snakeweed	GUMI	*Gutierrezia microcephala*	0–11	0–5
	banana yucca	YUBA	*Yucca baccata*	0–11	0–1
	California brickellbush	BRCA3	*Brickellia californica*	0–6	0–1
	Utah juniper	JUOS	*Juniperus osteosperma*	0–1	0–1
	grizzlybear pricklypear	OPPOE	*Opuntia polyacantha var. erinacea*	0–1	0–1
	sixweeks grama	BOBA2	*Bouteloua barbata*	0–1	0–1
Grass/Grasslike					
2	**Native Perennial Grasses**			0–2	
	purple threeawn	ARPU9	*Aristida purpurea*	0–1	0–1
	low woollygrass	DAPU7	*Dasyochloa pulchella*	0–1	0–1
	squirreltail	ELEL5	*Elymus elymoides*	0–1	0–1
3	**Native Annual Grasses**			0–28	
	sixweeks grama	BOBA2	*Bouteloua barbata*	0–28	0–10
Forb					
4	**Native Annual Forbs**			0–56	
	fringed amaranth	AMFI	*Amaranthus fimbriatus*	0–56	0–6
	whitemargin sandmat	CHAL11	*Chamaesyce albomarginata*	0–4	0–1
	threadstem carpetweed	MOCE	*Mollugo cerviana*	0–1	0–1

Contributors

Alice Lee Miller

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	05/21/2025
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:**

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

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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):**

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

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10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and 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):**

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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:**
