Ecological site R018XC109CA
Steep Marble Canyon Walls

Last updated: 4/24/2024
Accessed: 05/13/2025

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): 018X–Sierra Nevada Foothills

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Major Land Resource Area (MLRA) 18, Sierra Nevada Foothills is located entirely in California and runs north to south adjacent to and down-slope of the west side of the Sierra Nevada Mountains (MLRA 22A). MLRA 18 includes rolling to steep dissected hills and low mountains, with several very steep river valleys. Climate is distinctively Mediterranean (xeric soil moisture regime) with hot, dry summers, and relatively cool, wet winters. Most of the precipitation comes as rain; average annual precipitation ranges from 15 to 55 inches in most of the area (precipitation generally increases with elevation and from south to north). Soil temperature regime is thermic; mean annual air temperature generally ranges between 52 and 64 degrees F. Geology is rather complex in this region; there were several volcanic flow and ashfall events, as well as tectonic uplift, during the past 25 million years that contributed to the current landscape.

LRU notes

LRU 18XC is located on moderate to steep mountains and hills in the Sierra Nevada Foothills east of Fresno, CA. The major differences between the southern and northern foothills are the dryer climate (12 to 37 inches of annual precipitation), greater summer/winter temperature variation, and steeper topography of the southern foothills. The geology of this region is predominately granitoid. The elevation ranges between 300 and 4100 feet above sea level. Warmer temperatures and lower precipitation (than at higher latititudes) allow for blue oak grasslands to exist at higher elevations. The soil temperature regime is primarily thermic, however some mesic soils are found at higher elevations of 18XC. At these upper elevations, the break in soil temperature regime (between thermic and mesic) is highly aspect dependent. Southern and western aspects at the steep, high elevations promote chamise-yucca plant assemblages. Buckeye is common in the concave positions. Riparian trees that are generally absent from the northern LRU’s include California Sycamore (Plantanus racemosa) and lemon scented gum (Eucalyptus citriodora).

Classification relationships

CLASSIFICATION RELATIONSHIPS
This site is located within M261F, the Sierra Nevada Foothills Section, (McNab et al., 2007) of the National Hierarchical Framework of Ecological Units (Cleland et al., 1997), M261Fc, the Lower Granitic Foothills and M261Fd, Southern Granitic Foothills Subsections.

Level III and Level IV ecoregions systems (Omernik, 1987, and EPA, 2011) are: Level III, Central California Foothills and Coastal Mountains and Level IV, Ecoregion 6c, Southern Sierran Foothills.

Ecological site concept

This ecological site occurs on structural benches of steep to very steep hills and mountains. This site generally occurs on shallow soils formed in colluvium from marble and limestone parent materials. Slopes range from 45 to

80%. Annual precipitation ranges from 15 to 37 inches per year. Elevation ranges from 3000 to 4800 feet. This site generally occurs at elevations with thermic soil temperature regimes, but can occur on south facing slopes at higher elevations typically considered within the mesic soil temperature regime.

The high pH (compared to surrounding forest soils) and carbonate content of these soils, along with the steep slopes and shallow soils, are the main factors controlling vegetation expression at this site. Soils occurring at this site commonly have pH above 7.5. The main component associated with this site is Potwisha, a shallow soil classified as loamy, mixed, active, thermic Lithic Ultic Haploxerolls.

The vegetation communities associated with this ecological site form an assemblage of chamise (Adenostoma fasciculatum) and chaparral yucca (Yucca whipplei) that seem to occur solely in marble. Common associated species include Hansen's spikemoss (Selaginella hansenii) and cliffbrake species (Pellaea spp.).

Associated sites

F018XC203CA	**Cool Thermic Slopes** This site commonly occurs nearby.

Similar sites

R018XC107CA	**Thermic Granitic Foothills south-facing** Site relationships being developed.
R018XC110CA	**Cool Thermic Shallowly Dissected Slopes** Site relationships being developed.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Adenostoma fasciculatum* (2) *Hesperoyucca whipplei*
Herbaceous	(1) *Pellaea* (2) *Selaginella hansenii*

Physiographic features

This site occurs of elevations typically ranging from 3000 to 4800 feet on slopes typically ranging from 40 to 80%. Aspect is typically south-facing. The soils associated with this site commonly occur on backslopes of structural benches and canyon walls.

Figure 1.

Table 2. Representative physiographic features

Hillslope profile	(1) Backslope
Slope shape across	(1) Convex
Slope shape up-down	(1) Convex
Landforms	(1) Foothills > Structural bench (2) Foothills > Canyon wall
Flooding frequency	None
Ponding frequency	None
Elevation	914–1,463 m
Slope	40–80%
Water table depth	0 cm
Aspect	W, E, SE, S, SW

Table 3. Representative physiographic features (actual ranges)

Flooding frequency	None
Ponding frequency	None
Elevation	701–2,021 m
Slope	30–100%
Water table depth	0 cm

Climatic features

This ecological site is characterized by hot, dry summers and cool, wet winters, a typical Mediterranean climate. Mean annual precipitation ranges from 15 to 37 inches and usually falls from October to May. Mean annual air temperature ranges from 52 to 61 degrees F with 180 to 255 frost free days.

Table 4. Representative climatic features

Frost-free period (characteristic range)	180-255 days
Freeze-free period (characteristic range)	365 days
Precipitation total (characteristic range)	381-940 mm
Frost-free period (actual range)	165-270 days
Freeze-free period (actual range)	365 days
Precipitation total (actual range)	254-1,016 mm
Frost-free period (average)	235 days
Freeze-free period (average)	365 days
Precipitation total (average)	711 mm

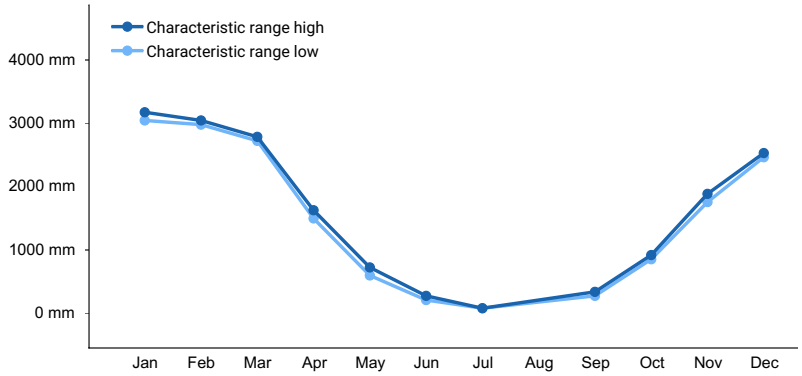

Figure 2. Monthly precipitation range

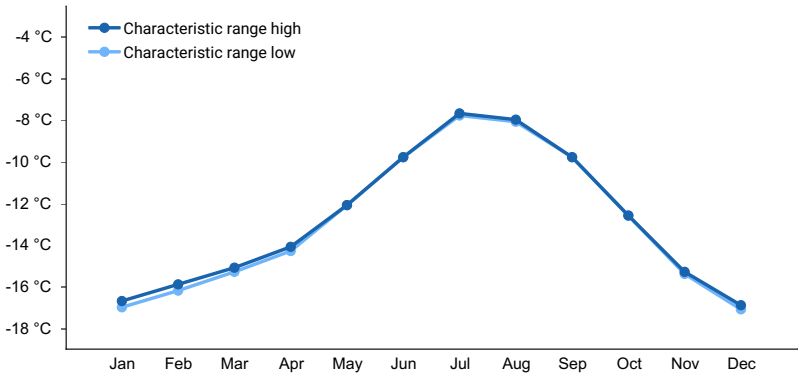

Figure 3. Monthly minimum temperature range

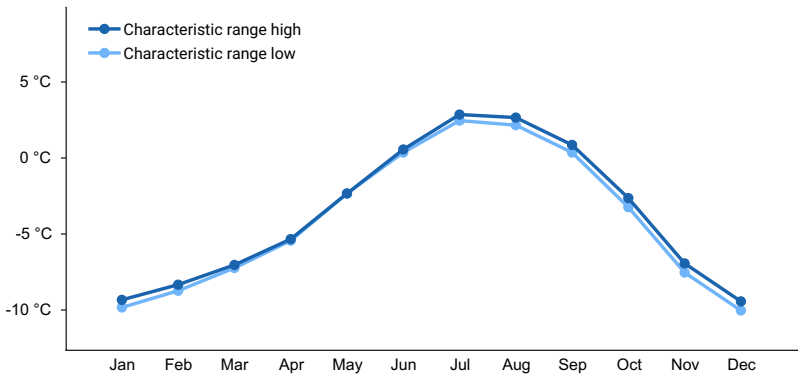

Figure 4. Monthly maximum temperature range

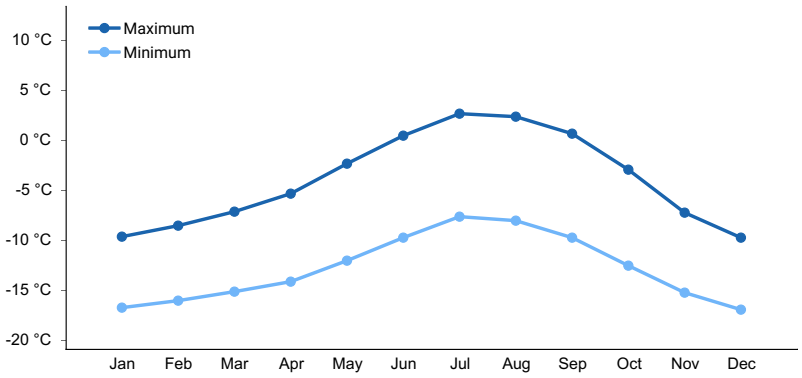

Figure 5. Monthly average minimum and maximum temperature

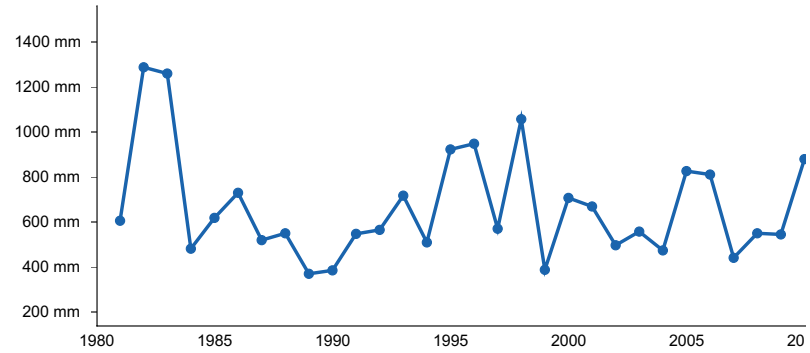

Figure 6. Annual precipitation pattern

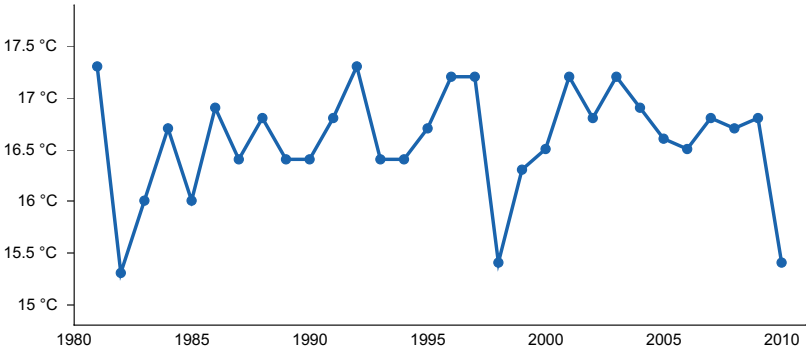

Figure 7. Annual average temperature pattern

Climate stations used

- (1) THREE RVRS EDISON PH 1 [USC00048917], Three Rivers, CA
- (2) ASH MTN [USC00040343], Three Rivers, CA

Influencing water features

Due to the topographic position, this site does not have water features or wetlands.

Wetland description

N/A

Soil features

The soils in this ecological site are formed from the colluvium and residuum of marble and limestone rock. The typical depth range is from shallow to moderately deep. These soils are typically 17 to 24 inches deep to restrictive bedrock. The particle size control sections are loamy, loamy-skeletal, and fine-loamy, and surface textures include gravelly fine sandy loam, gravelly sandy loam, and loam. Surface gravels (< 3 inch diameter) range between 20 to 30% cover, and larger fragments (= 3 inch diameter) range between 2 to 30% cover. Within the soil profile gravels range from 10 to 30%, and larger fragments from 0 to 10% by volume. The soils in this ecological site are well drained and the permeability class range is moderate to moderately rapid. Available Water Capacity (AWC) is between 1 and 4 inches, and the soil pH in the both the top 10 inches and in the subsurface 10 to 40 inches is between 7.2 and 8.2.

Common soils correlated to this ecological site are Potwisha (loamy, mixed, superactive, thermic Lithic Ultic Haploxerolls).
Common soil components in this ecological site include Potwisha and Potwisha taxadjunct, both formed in marble rock. Potwisha is shallow and Potwisha taxadjunct is moderately deep and loamy skeletal.

Figure 8.

Table 5. Representative soil features

Parent material	(1) Colluvium–marble (2) Residuum–marble
Surface texture	(1) Gravelly fine sandy loam (2) Gravelly sandy loam (3) Loam
Family particle size	(1) Loamy (2) Loamy-skeletal (3) Fine-loamy
Drainage class	Well drained
Permeability class	Moderate to moderately rapid
Depth to restrictive layer	43–61 cm
Soil depth	43–61 cm
Surface fragment cover <=3"	20–30%
Surface fragment cover >3"	2–30%
Available water capacity (0-101.6cm)	4.32–10.41 cm
Soil reaction (1:1 water) (0-25.4cm)	7.2–8.2
Subsurface fragment volume <=3" (0-101.6cm)	10–30%
Subsurface fragment volume >3" (0-101.6cm)	0–10%

Table 6. Representative soil features (actual values)

Drainage class	Well drained
Permeability class	Moderate to moderately rapid
Depth to restrictive layer	25–102 cm
Soil depth	25–102 cm
Surface fragment cover <=3"	0–30%
Surface fragment cover >3"	0–45%
Available water capacity (0-101.6cm)	2.29–10.92 cm

Soil reaction (1:1 water) (0-25.4cm)	6.8–8.3
Subsurface fragment volume <=3" (0-101.6cm)	5–50%
Subsurface fragment volume >3" (0-101.6cm)	0–60%

Ecological dynamics

State and transition model

STM: R018XC109CA

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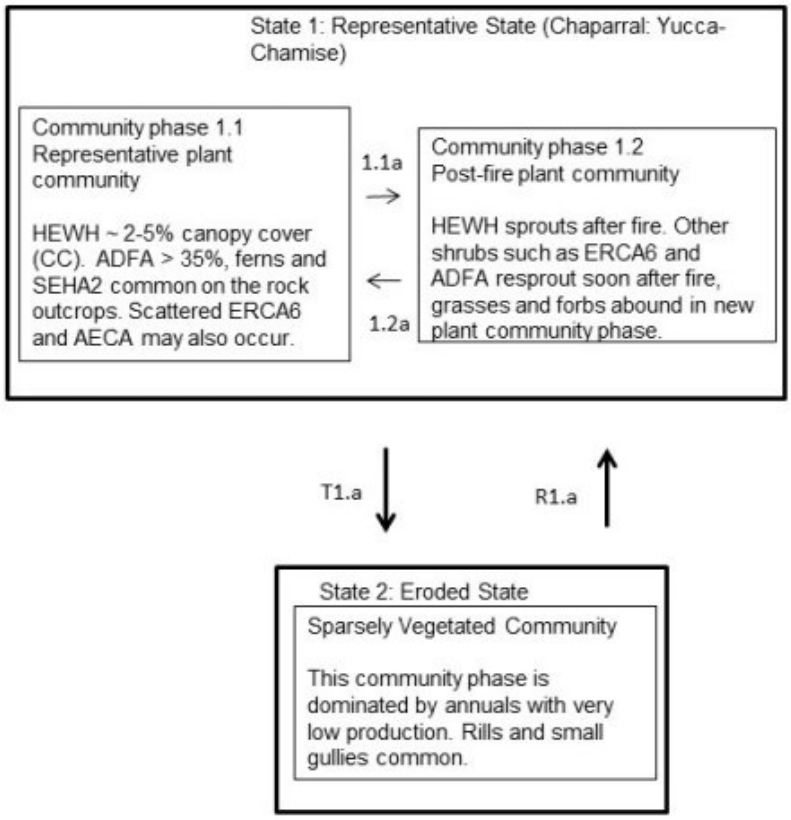

Community pathways and Transitions

T1.a This transition occurs when heavy or prolonged rainfall events occur following high severity fires. These conditions cause the steep, unvegetated hillslopes to be vulnerable to erosion, with consequent rill and gully formation and therefore a loss of soil and productivity.

1.1a This community pathway occurs with normal time and growth.

1.2a This community pathway occurs following a low to moderately severe fire.

R3.a This restoration pathway occurs with slope stabilization and revegetation work.

State 1

Community 1.1
Representative plant community

HEWH ~ 2-5% canopy cover (CC). ADFA > 35%, ferns and SEHA2 common on the rock outcrops. Scattered ERCA6 and AECA may also occur.

Dominant plant species

- chamise (*Adenostoma fasciculatum*), shrub
- chaparral yucca (*Hesperoyucca whipplei*), shrub
- Hansen's spikemoss (*Selaginella hansenii*), shrub

Community 1.2
Post-fire plant community

HEWH sprouts after fire. Other shrubs such as ERCA6 and ADFA resprout soon after fire, grasses and forbs abound in new plant community phase.

Dominant plant species

- chaparral yucca (*Hesperoyucca whipplei*), shrub
- California yerba santa (*Eriodictyon californicum*), shrub
- chamise (*Adenostoma fasciculatum*), shrub

Pathway P1.1a

Community 1.1 to 1.2

This community pathway occurs with normal time and growth.

Pathway P1.2a
Community 1.2 to 1.1

This community pathway occurs following a low to moderately severe fire.

State 2

Community 2.1
Sparsely Vegetated Community

This community phase is dominated by annuals with very low production. Rills and small gullies common.

Transition T1.a
State 1 to 2

This transition occurs when heavy or prolonged rainfall events occur following high severity fires. These conditions cause the steep, unvegetated hillslopes to be vulnerable to erosion, with consequent rill and gully formation and therefore a loss of soil and productivity.

Restoration pathway R2.a
State 2 to 1

This restoration pathway occurs with slope stabilization and revegetation work.

Additional community tables

Inventory data references

Inventory data to be collected using future projects based on priorities.

References

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Contributors

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Approval

Kendra Moseley, 4/24/2024

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	05/13/2025
Approved by	Kendra Moseley
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

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

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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:

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

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

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

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:**

17. **Perennial plant reproductive capability:**