Ecological site R015XI100CA
Hills, south-facing
17-19" p.z.

Accessed: 09/23/2026

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.

Classification relationships

Chamise series - Ecological Subregions of California, R5-EM-TP-005, Septemeber 1997. Chamise series - California Native Plant Society, Manual of California Vegetation. Chamise-Redshank Chaparral - California Wildlife Habitat Relationships System. California Department of Fish and Game, California Interagency Wildlife Task Group.

Associated sites

R015XI101CA	**Upper, north-facing slopes 17-19" p.z.** Upper, north-facing slopes 17-19" p.z. - R015XI100CA grades into this site as the slopes become more shaded and protected from sun exposure. Soil moisture and availability is greater and temperatures are cooler.
R015XI104CA	**Steep, clayey-skeletal, south-facing slopes 17-19" p.z.** Steep, clayey-skeletal, south-facing slopes 17-19" p.z. - R015XI100CA grades into this site in areas that are droughty, more exposed, and high in rock content.
R015XI110CA	**Exposed, rocky slopes 17-19" p.z.** Exposed, rocky slopes 17-19" p.z. - R015XI100CA grades into this site in areas where the bedrock is at or near the soil surface and soils are very shallow.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Adenostoma fasciculatum* (2) *Ceanothus cuneatus*
Herbaceous	Not specified

Physiographic features

This ecological site is located on hills with slopes ranging from 2 to 75% at elevations from 984 to 2998 feet, and is found primarily on south-facing slopes.

Table 2. Representative physiographic features

Landforms	(1) Hill (2) Terrace
Elevation	300 – 910 m
Slope	0 – 80 %
Aspect	SE, S, SW

Climatic features

The average annual precipitation in MLRA 15 is from 6 to 20 inches (150 to 510 millimeters) in the area south of San Francisco, and snowfall is rare. The north half of this area can be divided into two rainfall and snowfall zones. The southern half north of San Francisco has an average annual precipitation from 18 to 40 inches (460 to 1,015 millimeters) and snowfall is rare. In the north half, average annual precipitation is from 40 to 79 inches per year (1,015 to 2,010 millimeters) and snowfall is common. Precipitation is evenly distributed throughout fall, winter, and spring but is very low in summer. Coastal areas receive some moisture from fog in summer. Most of the rainfall occurs as low to moderate intensity, Pacific frontal storms during the winter from October to May. The average annual temperature is from 51 to 66 degrees F (10 to 19 degrees C), decreasing from south to north. The average frost-free period is 275 days (180 to 365 days), decreasing with elevation and from south to north.

At Pinnacles National Monument, the average annual precipitation is 17 inches with a range between 17 and 19 inches, mostly from rain in the winter months from November through April. The average annual air temperature is between 59 and 63 degrees Fahrenheit, and the frost-free period (>32F) is 190 to 210 days.

NOTE: Data collected for monthly precipitation and temperatures is only from one climate station.

Table 3 Representative climatic features

Frost-free period (average)	200 days
Freeze-free period (average)	0 days
Precipitation total (average)	460 mm

Influencing water features

Water features are not a part of the ecological site.

Soil features

The soils for this ecological site range from shallow to very deep, and are often sandy or sandy loams. They are derived from residuum weathered from rhyolite (Argixerolls and Knuckle), residuum weathered from conglomerate (Longsfolly, Ordeal, Passion, and Pinnacles), residuum weathered from shale (Santa Lucia), residuum weathered from sandstone (Pinnacles), and consolidated gravelly coarse-loamy alluvium derived from igneous rock (Pinnacles).

The soils under the chamise range from deep, weakly developed soils to shallow, rocky soils. They are all generally sandy loams with a gravelly texture modifier. Many of the soils, due to their coarse grain size and their high content of weatherable minerals are susceptible to erosion, and on steeper slopes, to landslides. Fertility in these soils is generally low, in some cases due simply to the low nutrient content of the parent materials, as well as the low contribution of organic matter from the chamise itself. Soils under chamise can also exhibit hydrophobicity, repelling water on the soil surface, however when water does penetrate the soil surface, it drains rapidly through the coarse soil textures, offering little water-holding capacity.

This ecological site occurs on the following soil components in the Pinnacles National Monument soil survey.

SSA MU Symbol Component name

CA069 101 Ordeal
CA069 101 Passion
CA069 104 Knuckle
CA069 104 Argixerolls
CA069 106 Argixerolls
CA069 110 Knuckle
CA069 111 Backdoor (south-facing)
CA069 114 Ordeal
CA069 114 Passion
CA069 127 Argixerolls
CA069 142 Ordeal
CA069 142 Longsfolly
CA069 155 Knuckle
CA069 156 Knuckle

Table 4. Representative soil features

Family particle size	(1) Sandy
Drainage class	Somewhat excessively drained to well drained
Permeability class	Moderately slow to rapid
Soil depth	20 – 200 cm
Surface fragment cover <=3"	10 – 40 %
Surface fragment cover >3"	0 – 10 %
Available water capacity (0-101.6cm)	1.02 – 6.1 cm
Electrical conductivity (0-101.6cm)	Not specified
Soil reaction (1:1 water) (0-101.6cm)	4.5 – 7.8
Subsurface fragment volume <=3" (Depth not specified)	0 – 80 %

Subsurface fragment volume >3" (Depth not specified)	0 – 40 %

Ecological dynamics

Before European settlement, the natural plant communities for this ecological site ranged from chamise-dominated chaparral with little to no understory to chamise-grasslands dominated by native perennial grasses and forbs. The reference state for this ecological site is similar to its pre-European state; however density of chamise may be different due to fire suppression and annual grasses and forbs now commonly dominate the understory. Primary species include oats (Avena spp.), bromes (Bromus spp.), and annual fescues (Vulpia spp.). These two plant communities can be found throughout this ecological site, however the chamise-dominated plant community is more prevalent, primarily due to a lack of fire in much of Pinnacles National Monument.

The reference state for this ecological site is almost exclusively composed of chamise (Adenostoma fasciculatum), with lesser dominants including buckbrush (Ceanothus cuneatus), black sage (Salvia mellifera), common deerweed (Lotus scoparius), California buckwheat (Eriogonum fasciculatum), and an understory composed of native and annual grasses and forbs. Other species that can be found throughout this ecological site include; birchleaf mountain mahogany (Cercocarpus betuloides var. betuloides), wooly yerba santa (Eriodictyon tomentosum), chaparral clarkia (Clarkia affinis), bluegrass (Poa spp.), oniongrasses (Melica spp.), silver hairgrass (Aira caryophyllea), ripgut grass (Bromus diandrus), soft brome (Bromus hordeaceus), oats (Avena spp.), smooth catsear (Hypochaeris glabra), rabbitfootgrass (Polypogon monspeliensis), rat-tail fescue (Vulpia myuros), goldback fern (Pentagramma triangularis), and bushy spikemoss (Selaginella bigelovii).

Chamise is the most characteristic and widely distributed chaparral species in California, and is also the most common ecological site found throughout Pinnacles National Monument. Chamise typically dominates the shrub cover of California’s chaparral communities on the more xeric sites, where evapotranspiration is higher and exposures are harsher, however it can be found as a lesser or co-dominant in mixed chaparral sites that include manzanitas (Arctostaphylos spp.), scrub oaks (Quercus spp.), and ceanothus (Ceanothus spp.). It is drought resistant, using its well-developed root system as a primary mechanism of survival on these dry, exposed soils. Chamise roots are many times more extensive then the aboveground portions and can penetrate deep into the soil profile, creating a widespread network of horizontal and lateral roots that can even penetrate fractured bedrock in search of water. Besides its elaborate root system, its reproductive traits and fire adaptations allow chamise to establish dominance and many times create uniform, dense stands. Chamise can reproduce both sexually by seed and vegetatively by resprouting at the crown from a primary lignotuber. Since chamise seeds germinate at high rates after fire, seedling recruitment and establishment are fire dependent, whereas vegetative sprouting can occur with or without the influence of fire (McMurray 1990).

Chamise chaparral is unable to perpetuate itself without fire (McMurray 1990). Old stands more than 60 years old have low species diversity, produce very little annual growth, becoming decadent, and in many cases almost impenetrable. Fire clears out these old plants, removing dead branches, increasing the concentration of available nutrients, and stimulating seed germination and new basal sprouting. Chamise is present from soon after a fire and remains present throughout all stages of succession. It is adapted to a fire cycle that can range anywhere from 10 to 100 years, however 30 to 80 years have been suggested as a more “typical” fire frequency (McMurray 1990).

State and transition model

Figure 5. Hills, south-facing 17-19" p.z. model

Additional community tables

Table 5. Community 1.1 plant community composition

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

Table 6. Community 2.1 plant community composition

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

Table 7. Community 3.1 plant community composition

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

Table 8. Community 4.1 plant community composition

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

Table 9. Community 5.1 plant community composition

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

Table 10. Community 6.1 plant community composition

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

Table 11. Community 7.1 plant community composition

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

Animal community

Wildlife species found in this habitat type are also found in mixed chaparral, coastal scrub, and in the shrubs beneath many woodland and forestland types. Over seventy species of mammals occur in these habitats, with five endemic and near-endemic species– the giant kangaroo rat (Dipodomys ingens), Heermann kangaroo rat (Dipodomys heermani), Santa Cruz kangaroo rat (Dipodomys venustus), Sonoma chipmunk (Eutamias sonomae), and the Suisun shrew (Sorex sinuosus). Among the 100 species of birds that occur in this ecoregion, scrub jays (Aphelocoma coerulescens), acorn woodpeckers (Melanerpes formicivorus), and wrentits (Chamaea fasciata), are a few of the most characteristic species. Army ants (Neivamyrmex spp.) and primitive bristletails, and land snails are among the ecoregion's large number of relict and unusual invertebrate species. Many species and communities within the ecoregion are adapted to periodic fires, indeed many species depend upon fires for regeneration. An entire guild of annual herbaceous plants that occur in chamise chaparral have seeds that lie dormant for long periods until fires trigger their germination approximately every 20-25 years.

Inventory data references

ADFA-01 - % ADFA-02 - % ADFA-03 - % ORDEAL-BRN - % & LBS ORDEAL-BN1 - % & LBS

Other references

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McMurray, N.E. 1990. Salvia mellifera. 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/ [2006, October 13].

Odion, D.C. and F.W. Davis. 2000. Fire, Soil, Heating, and the Formation of Vegetation Patterns in Chaparral. Ecological Monographs. 70: 149-169.

Contributors

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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	
Approved by	
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):**

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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:**
