Ecological site R019XI105CA
Deep slopes 13-24" p.z.

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.

Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

Similar sites

R019XI106CA	**Shallow slopes 13-31" p.z.** This is a prostrate chamise chaparral type, found on wind blown ridges.
R019XI112CA	**Moderately deep volcanic slopes 13-31" p.z.** This is an oak woodland-chaparral ecological site found on volcanic soils.
R019XI108CA	**Convex slopes 13-24" p.z.** This site has similar species, but much more continuous and consistently higher chaparral cover.
R019XI109CA	**Shaly slopes 13-24" p.z.** This is a chaparral community dominated primarily by Quercus pacifica.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Cercocarpus montanus var. blancheae* (2) *Ceanothus megacarpus var. insularis*
Herbaceous	Not specified

Physiographic features

This ecological site is found on hillslopes ranging from 2 to 75 percent and elevations from

sea level to 2470 feet. It is found on all aspects, but most commonly on southern aspects.

Table 2. Representative physiographic features

Landforms	(1) Hill
Flooding frequency	None
Ponding frequency	None
Elevation	0–753 m
Slope	2–75%
Aspect	SE, S, SW

Climatic features

This ecological site is found only on Santa Cruz Island, and due to it's size, the temperature and precipitation ranges have been grouped together to capture the entire island's variance.

The average annual precipitation is 19 inches with a range between 13 to 24 inches, mostly in the form of rain in the winter months (November through April). The average annual air temperature is approximately 56 to 73 degrees Fahrenheit, and the frost-free (>32F) season is 320 to 365 days.

Table 3. Representative climatic features

Frost-free period (average)	365 days
Freeze-free period (average)	365 days
Precipitation total (average)	610 mm

Influencing water features

This site is not influenced by wetland or riparian water features.

Soil features

The soils are derived from residuum weathered from andesite, basalt, volcanic breccia, diorite, and gabbro parent materials. The soils are moderately deep to deep, with loamy or sandy textures. Mean annual soil temperatures (MAST) range from 54 to 59 degrees F on north-facing slopes, which are classified as isomesic and 59 to 71 degrees F on south-facing slopes, which are classified as thermic.

This ecological site is found in the following mapunits and components:

SSA MU Component
CA688 150 Halyard
CA688 151 Halyard
CA688 152 Halyard
CA688 310 Macool
CA688 800 Halyard

Table 4. Representative soil features

Surface texture	(1) Gravelly
Family particle size	(1) Clayey
Drainage class	Moderately well drained
Permeability class	Slow
Soil depth	51–127 cm
Available water capacity (0-101.6cm)	11.43–15.75 cm
Calcium carbonate equivalent (0-101.6cm)	1–6%
Electrical conductivity (0-101.6cm)	0 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0
Soil reaction (1:1 water) (0-101.6cm)	5.6–7.8
Subsurface fragment volume <=3" (Depth not specified)	5–15%
Subsurface fragment volume >3" (Depth not specified)	1%

Ecological dynamics

Before European settlement, the natural plant communities for this ecological site ranged from a pre-fire ecology of dense island chaparral with a sparse understory of native grasses and forbs to a post-fire open, patchy island chaparral grassland dominated community. The reference state for this ecological site is similar to its pre-European state. However, the density of the island chaparral may be different due to more frequent fires and the invasion of non-native annual grasses and forbs. Primary species include island big-pod ceanothus (Ceanothus megacarpos spp. insularis), Channel Island scrub oak (*Quercus pacifica*), chamise (*Adenostoma fasciculatum*), island mountain mahogany

(*Cercocarpus montanus* var. blancheae), island redberry (*Rhamnus pirifolia*), lemonade sumac (*Rhus integrifolia*) and manzanitas (Arctostaphylos spp.). In the central valley of Santa Cruz Island, this habitat is open and patchy, and is intermixed with the coastal sagebrush and grassland ecological sites.

Mixed chaparral is one of the most dominant and widely known plant communities throughout much of the Channel Islands. It is comprised of dense stands of shrubs that are all structurally similar with deep roots and evergreen, sclerophyllous leaves. Depending on the combined influences of disturbance, elevation, aspect and soils, the variation of species within the mixed chaparral habitat will be different. Although soil and parent material have some influence on the variety of species, microclimatic differences in soil moisture, temperature, and aspect often dictate what species will be most dominant in a given location (England 2006 and Fried et al 2004).

The primary elements that maintain this ecological site are drought and fire. Chaparral species are physiologically adapted to droughty conditions and many are also well-adapted to fire. Some of these fire adaptations include: sclerophyllous leaves, specialized stomates, extensive rooting systems which take advantage of water near the soil surface as well as water far into the soil profile, the shape of the canopies which dissipates radiation by convection, the height of the shrubs which can keep the leaves away from the hot soil surface, post-fire crown sprouting, and seeds that often require high temperatures before germination (Fried et al 2004).

The successional patterns of chaparral begin and end with fire. Chaparral can develop into extremely dense, sometimes impenetrable stands and many of the shrubs become senescent, requiring a fire to clear out the dead branches and heavy litter. This clearing recharges the soil's available nitrogen and carbon and stimulate new growth and seed germination. Most of the dominant chaparral species are able to rapidly recover and grow after a fire. Very little research can be found on the fire adaptations of the island endemic chaparral species; however similar species that are found on the mainland are capable of re-sprouting and reseeding after fire, which suggests these species have similar adaptations. Post-fire chaparral on north-facing slopes exhibit higher species richness, higher species turnover rates, and faster vegetation recovery in terms of biomass accumulation, causing it to return to pre-fire species composition faster than chaparral communities found on the drier, south-facing slopes (Guo 2001).

The historical fire regime for these mixed chaparral communities is difficult to determine prior to European settlers arrival, however there are indications of a fire-return interval was probably greater than 70 years, with lightning being the primary ignition source (Keeley and Fotheringham 2001). Fire intervals may have been up to 200 years, but have generally increased to 40 to 50 year intervals with the increase in human caused fires.

Chaparral is an important habitat for many species of birds, reptiles, rodents and mammals. Some deep habitat dwellers rely almost entirely on chaparral for food, shelter, and reproduction sites. Others may occupy the ecotonal zones between the chaparral and

woodland, chaparral, and grassland, or chaparral and riparian habitats to satisfy their various needs. As the chaparral becomes denser, it will become too crowded for many of these species to properly utilize the habitat. Consequently, fires are necessary to open up the canopy, which will provide better movement through the site. It also stimulates new growth of the shrubs as well as the understory herbaceous species, providing more food and shelter for a greater variety of species.

State and transition model

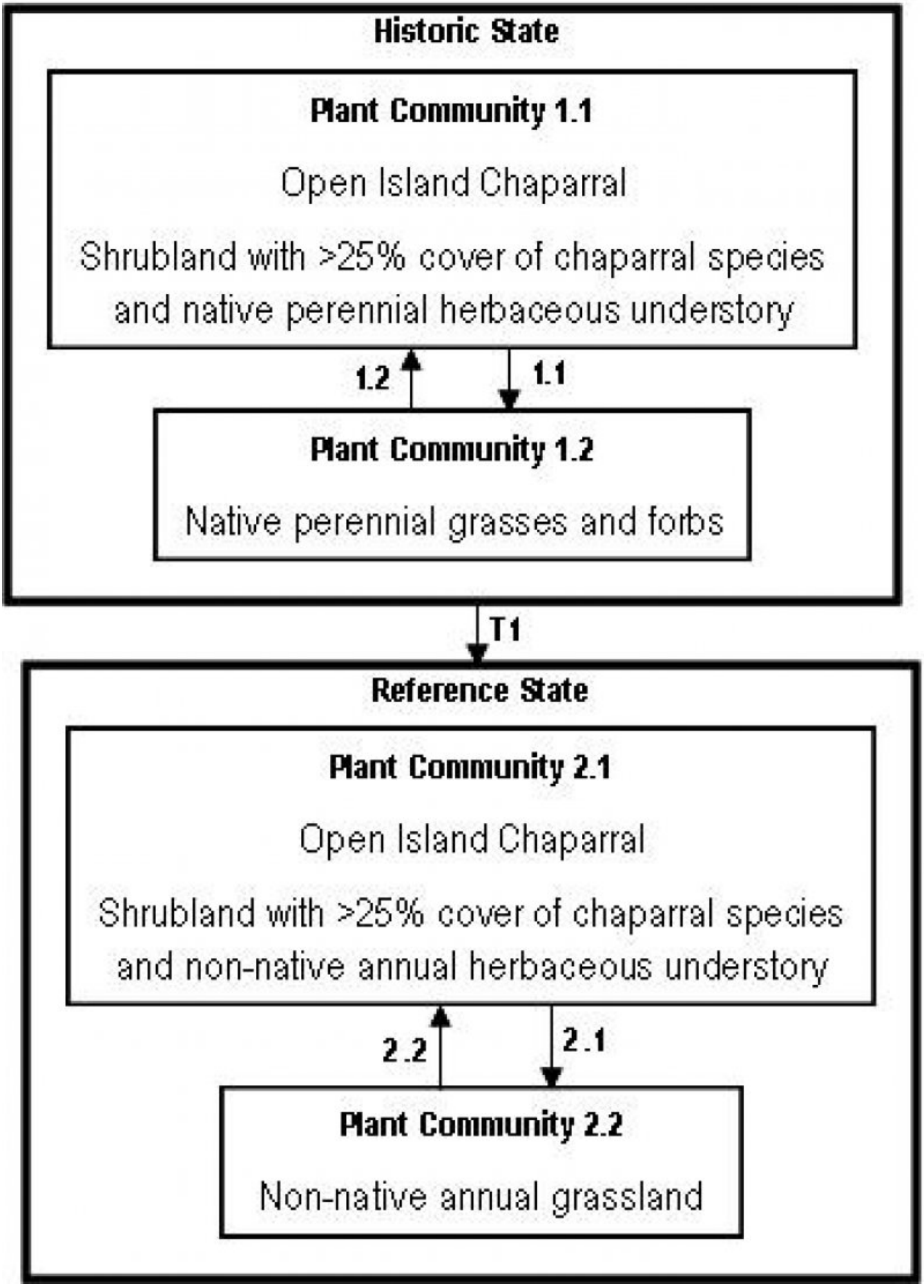

Figure 3. State Transition Model

State 1
Historic State- Plant Community 1.1

Community 1.1
Historic State- Plant Community 1.1

This is the historic state and is dominated by a shrubland that consisted of more that 25 percent cover of chaparral species with a native perennial herbaceous understory. Common chaparral species included Channel Island ceanothus (*Ceanothus megacarpus* var. insularis), island mountain mahogany (*Cercocarpus montanus* var. blancheae), Channel Island scrub oak (*Quercus pacifica*), chamise (Adenastoma fasiculatum), and California sagebrush (*Artemisia californica*). Community Pathway 1.1: The shift from PC 1.1 to PC 1.2 occurred under the historical fire regime of approximately 70 to 200 years, with lightning being the primary ignition source. Fires resulted in a patchy chaparral grassland community dominated by native perennial grasses and forbs.

State 2
Plant Community 1.2

Community 2.1
Plant Community 1.2

This state was dominated by native grasses and annual forbs, which grow well while the canopy is open during the first couple of years following a fire. Most of the dominant chaparral species are able to rapidly recover and grow after a fire, which will eventually lead back to PC 1.1. Community Pathway 1.2: The shift from PC 1.2 back to PC 1.1 generally occurs 3 to 5 years after a fire event. Given an extended period of time without disturbance from fires or grazing, new shrubs will resprout and begin to increase in size and cover. Eventually, the herbaceous grass and forb cover in the understory will start to diminish as they are shaded out by the shrubs. The chaparral species, such as island mountain mahogany (*Cercocarpus montanus* var. blancheae), chamise (*Adenostoma fasciculatum*), and probably Channel Island scrub oak (*Quercus pacifica*) will resprout from the root crown. Some species will produce abundant seedlings including chamise (*Adenostoma fasciculatum*), and possibly island ceanothus (*Ceanothus megacarpus* spp. insularis). Transition 1: Frequent fires and non-natural grazing by livestock and non-native wildlife can place a stress on PC 1.2. This pressure can give an advantage to encroaching non-native plant species and may lead to the invasion of non-native annual grasslands.

State 3
Reference State - Plant Community 2.1

Community 3.1

Reference State - Plant Community 2.1

This state is similar to the historic state, plant community 1.1, and is still dominated by chaparral species; however it is now intermixed with a non-native annual grassland community, which is common throughout California. The primary species are slender oat (*Avena barbata*); wild oat (*Avena fatua*); ripgut brome (*Bromus diandrus*); soft brome (*Bromus hordeaceus*); and Spanish brome (*Bromus madritensis*). Community Pathway 2.1: The shift from PC 2.1 to PC 2.2 occurs under a fire regime of approximately 70 to 200 years, with lightning being the primary ignition source. Fires have generally increased to 40 to 50 years due to an increase in human-caused fires since the arrival of European settlers. Fires result in a patchy chaparral grassland community dominated by non-native annual grasses

State 4
Plant Community 2.2

Community 4.1
Plant Community 2.2

This community is dominated by non-native annual grasslands, which will grow well while the canopy is open during the first couple of years following a fire. Most of the dominant chaparral species are able to rapidly recover and grow after a fire, which will eventually lead back to PC 2.1. Community Pathway 2.2: The shift from PC 2.2 back to PC 2.1 generally occurs after an extended period of time without disturbance by fire or grazing. New chaparral shrubs will resprout and begin to increase in size and cover. Eventually, the non-native annual grasslands will start to diminish as they are shaded out by the shrubs.

Additional community tables

Table 5. Community 1.1 plant community composition

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

Table 6. Community 3.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Shrub/Vine					
1	**Shrubs**			560–1681	
	coastal sagebrush	ARCA11	*Artemisia californica*	168–560	–
	island ceanothus	CEMEI2	*Ceanothus megacarpus var. insularis*	112–280	–
	island mountain mahogany	CEMOB	*Cercocarpus montanus var. blancheae*	112–280	–
	Santa Cruz Island buckwheat	ERAR6	*Eriogonum arborescens*	11–224	–
	lemonade sumac	RHIN2	*Rhus integrifolia*	22–168	–
	chamise	ADFA	*Adenostoma fasciculatum*	11–112	–
	Channel Island scrub oak	QUPA6	*Quercus pacifica*	22–56	–
	island broom	LODE2	*Lotus dendroideus*	1–28	–
Grass/Grasslike					
2	**Grasses**			224–897	
	wild oat	AVFA	*Avena fatua*	56–448	–
	needlegrass	NASSE	*Nassella*	168–336	–
	soft brome	BRHOH	*Bromus hordeaceus ssp. hordeaceus*	1–56	–
	compact brome	BRMA3	*Bromus madritensis*	11–34	–
Forb					
3	**Forbs**			1–56	
	monkeyflower	MIMUL	*Mimulus*	1–34	–
	cudweed	GNAPH	*Gnaphalium*	1–6	–

Inventory data references

The following NRCS plots were used to describe this ecological site.
SC-391 lbs - Site location
SCV-113 %
SCV-104 %
SC-278 lbs

Type locality

Location 1: Santa Barbara County, CA	
UTM zone	N
UTM northing	3765467
UTM easting	248210
General legal description	The site location is on Santa Cruz Island, on the north side of the Central Valley on a south facing slope, across from the UC Field Station.

Other references

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Contributors

Munnecke

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):**

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:**
