Ecological site R019XI110CA
Concave slopes 13-24" p.z.

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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.

Associated sites

R019XI108CA	**Convex slopes 13-24" p.z.** This site is similar, but has lower cover and less diversity. It is found on the ridges and shoulders separating the drainages dominated by the denser chaparral.

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.
R019XI109CA	**Shaly slopes 13-24" p.z.** This is a chaparral comunity dominated primarily by Quercus pacifica.
R019XI105CA	**Deep slopes 13-24" p.z.** This is a chaparral ecological site generally found on south slopes with coastal sage.

Table 1. Dominant plant species

Tree	Not specified
Shrub	(1) *Quercus pacifica* (2) *Heteromeles arbutifolia*
Herbaceous	Not specified

Physiographic features

This ecological site is found on concave positions such as draws and swales in between ridges. It is generally located on northern aspects, with slopes ranging from 30 to 75 percent, and with an elevation ranging from sea level to 2470 feet.

Table 2. Representative physiographic features

Landforms	(1) Hill
Flooding frequency	None
Ponding frequency	None

Elevation	0–2,470 ft
Slope	30–75%
Aspect	N, NE, NW

Climatic features

This ecological site is found only on Santa Cruz Island. Due to its size, 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)	24 in

Influencing water features

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

Soil features

These soils formed on residuum from schist. Soil textures are clayey and often times have a gravelly modifier. They are moderately deep to bedrock and well-drained with moderately slow permeability, high runoff, and available water content between 2.9 to 5.1. Mean annual soil temperatures (MAST) range from 54 to 59 degrees F, which are classified as isomesic.

This ecological site is found on the following map units and soil components:

SSA MU SYM Component
CA688 120 Yardarm
CA688 130 Yardarm
CA688 240 Yardarm

Table 4. Representative soil features

Surface texture	(1) Gravelly (2) Very gravelly
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Moderately slow
Soil depth	20–40 in
Available water capacity (0-40in)	2.9–5.1 in
Electrical conductivity (0-40in)	0 mmhos/cm
Sodium adsorption ratio (0-40in)	0

Soil reaction (1:1 water) (0-40in)	5.6–6.5
Subsurface fragment volume <=3" (Depth not specified)	2–35%

Ecological dynamics

The reference state for this ecological site is the Channel Island mixed chaparral community. It is found on the north facing slopes, on the south side of the central valley on Santa Cruz Island. It is generally in concave positions on schist parent material. The Island Ironwood forest is found in small patches on north facing draws within this ecological site. It is also found on Santa Rosa Island in Cherry Canyon, with a more open canopy. Common species include Channel Island scrub oak (*Quercus pacifica*), toyon (*Heteromeles arbutifolia*), Channel Island cherry (*Prunus ilicifolia* subsp. Lyonii), island ceanothus (*Ceanothus arboreus*), summer holly (*Comarostaphylis diversifolia* var. Planifolia), lemonade sumac (*Rhus integrifolia*), California live oak (*Quercus agrifolia*), bush monkeyflower (Mimulus longiflorus), and Cucamonga manroot (Marrah macrocarpus). This community is very similar to the historic plant community in species composition, but severe grazing on the lower branches of the shrubs has altered their stature to appear more arborescent. Several non-native species have been introduced to this area as well, mostly non-native annual grasses.

The historical fire regime for this community is unclear. The natural fire return interval for the chaparral in this area was probably greater than 70 years (Keeley and Fotheringham, 2001). Fire intervals may have been up to 200 years, but have generally increased near 40 to 50 year intervals with the increase in human caused fires. Lightning, the primary natural ignition source, is very uncommon on these islands (Keeley, 2000). Only three lightning-ignited fires have been documented on the Channel Islands in the last 140 years (Junak et al., 1995). Historical evidence from the nearby Santa Monica Mountains indicates that when chaparral burns, it is very intense and difficult to control (Keeley, 2002). When fires are ignited early in the season they tend to remain small in size. However, the Santa Ana winds in the fall can spread fires rapidly and cover large areas. Fire in this community almost always burns the entire canopy, and so it is very unlikely it would remain a surface fire.

After a fire, native grasses and annual forbs dominate for a couple of years, but the chaparral shrubs quickly regain dominance by re-sprouting and establishing seedlings. The chaparral community can be replaced by the non-native annual grassland community if fires become too frequent. This community can also be caused by heavy grazing which can inhibit the shrubs from regenerating properly and can also lead to soil loss. The grasses can in-turn increase the frequency of fire since they provide an easily ignitable, continuous fuel cover.

Many of the shrubs are dependent on fire for regeneration. However, if fire becomes too frequent (less than 10 year intervals) it can detrimentally affect the chaparral species that rely on establishing seedlings rather than re-sprouting after a burn. These reseeding species do not reach maturity during short fire intervals, and cannot replenish their seed banks in time. Frequent fires also tend to favor non-native annual grasses and forbs. (Haidinger and Keeley, 1993; Keeley 2003). Very little research can be found concerning the fire effects on many island species, namely Santa Cruz Island manzanita (*Arctostaphylos insularis*), Channel Island scrub oak (*Quercus pacifica*), island ceanothus (Ceanothus arboreous), island big-pod ceanothus (Ceanothus megacarpos ssp. insularis), summer holly (*Comarostaphylis diversifolia* var. Planifolia), and lemonade sumac (*Rhus integrifolia*). More research is needed to determine which shrubs tend to re-sprout and which are obligate seeders. Similar species indicate that the Santa Cruz Island manzanita, Channel Island Scrub oak and lemonade sumac probably resprout and reseed after fire. The Ceanothus species may be more seedling-dependent.

State and transition model

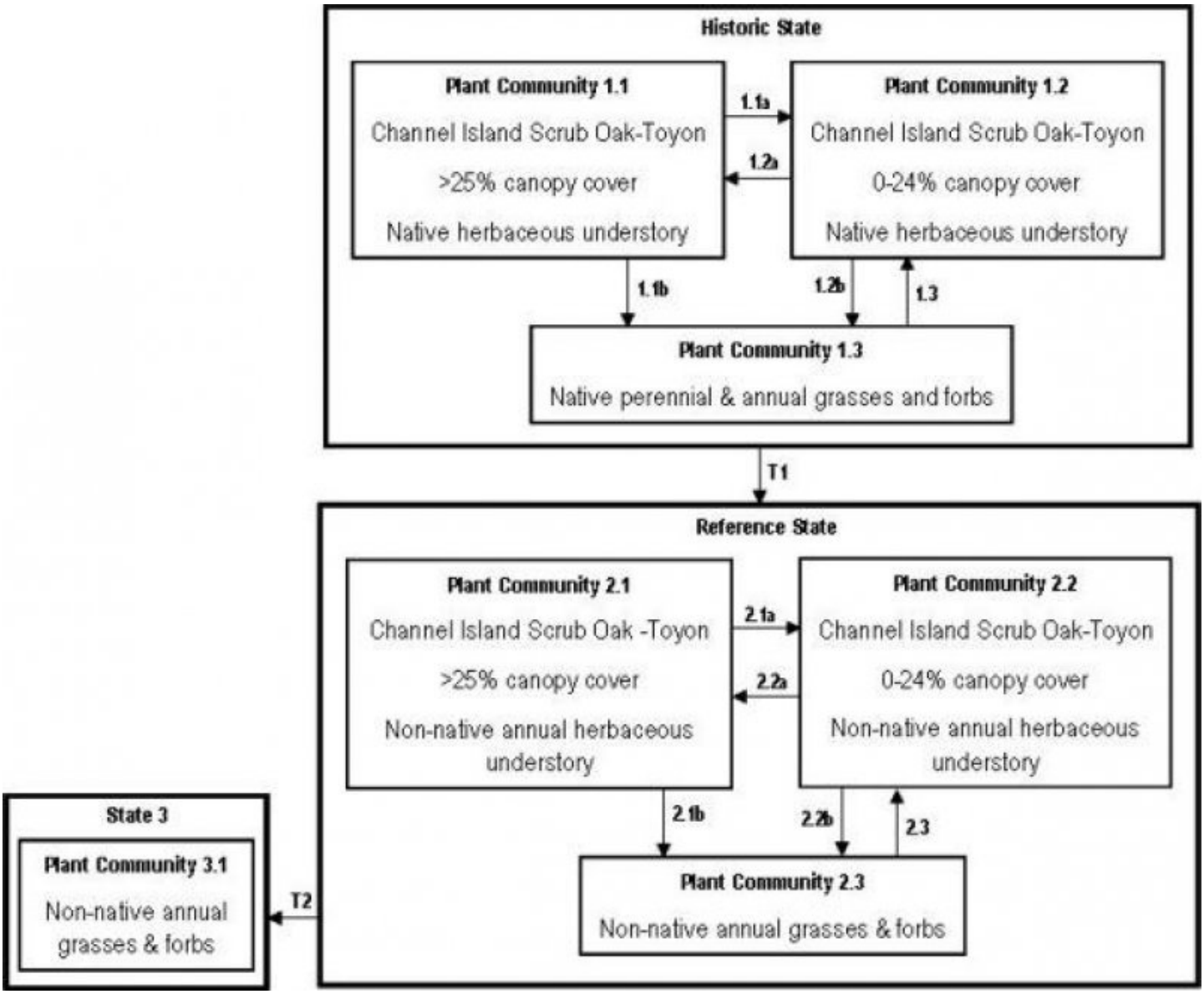

Figure 3. State Transition model

State 1
Reference State - Plant Community 2.1

Community 1.1
Reference State - Plant Community 2.1

This state is similar to the reference state, PC 1.1 and is still dominated by Channel Island mixed chaparral, but now has an understory of non-native annual grasses and forbs. The non-native annual grassland community is common throughout California. The primary species are slender oat (*Avena barbata*), wild oat (*Avena fatua*), ripgut grass (*Bromus diandrus*), soft brome (*Bromus hordeaceus*), and Spanish brome (*Bromus madritensis*). Community Pathway 2.1a: The shift from PC 2.1 to PC 2.2 historically occurred under a fire regime of approximately 70 to 200 years, with lightning being the primary ignition source. However, 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 decrease in shrub cover and an increase in the non-native understories dominated by non-native annual grasses. Community Pathway 2.1b: The transition from PC 2.1 to PC 2.3 occurs if fires become more frequent (less than 10 year intervals). Non-natural grazing by livestock and non-native wildlife can also push PC 2.1 towards PC 2.3.

State 2
Plant Community 1.2

Community 2.1

Plant Community 1.2

This state is dominated by native grasses and annual forbs, which will grow well while the canopy is open during the first couple of years following a fire. Most of the dominant shrub species are able to rapidly recover and grow after a fire, which will eventually lead back to PC 1.1. Community Pathway 1.2a: The shift from PC 1.2 back to PC 1.1 generally occurs after an extended period of time without disturbance from fires or grazing. After a fire, toyon (*Heteromeles arbutifolia*), hollyleaf cherry (*Prunus ilicifolia*), and probably Channel Island scrub oak (*Quercus pacifica*) and lemon sumac (*Rhus integrifolia*) will resprout from the root crown. Lemon sumac will also produce abundant seedlings. As the shrubs continue to increase in size and cover, they will eventually shade out the grasses and forbs in the understory and lead back to the pre-fire canopy cover of PC 1.1. Community Pathway 1.2b: The shift from PC 1.2 to PC 1.3 will take place under continued grazing or frequent fires (less than 10 year intervals). These disturbances will hinder the new growth of shrubs, leading to a state dominated by native perennial and annual herbaceous species.

State 3
Historic State - Plant Community 1.1

Community 3.1
Historic State - Plant Community 1.1

This community is represented by Channel Island mixed chaparral and is dominated mostly by Channel Island scrub oak (*Quercus pacifica*) and toyon (*Heteromeles arbutifolia*). Other common plants include summer holly (*Comarostaphylis diversifolia*), hollyleaf cherry (*Prunus ilicifolia*), and lemon sumac (*Rhus integrifolia*). It is found on concave positions and has a denser canopy than its neighboring chaparral community found on the convex positions, which is dominated by Channel Island scrub oak and Channel Island manzanita (see R020XI108CA). Community Pathway 1.1a: The shift from PC 1.1 to PC 1.2 occurs under the natural fire regime of approximately 70 to 200 years, with lightning being the primary ignition source. Fire results in a decrease in shrub cover and an increase in the native perennial and annual herbaceous understory community. Community Pathway 1.1b: The shift from PC 1.1 to PC 1.3 occurs if fires become more frequent (less than 10 year intervals). Grazing by livestock and non-native wildlife can also push PC 1.1 towards PC 1.3.

State 4
Plant Community 1.3

Community 4.1
Plant Community 1.3

If frequent fire or heavy grazing continually impacts this site, the regeneration and growth of the shrubs will be greatly hindered. This will lead to a site dominated by native perennial and annual herbaceous species. Community Pathway 1.3: The shift from PC 1.3 back to PC 1.2 can occur after an extended period of time without disturbance from fires or grazing. Restoration efforts can also help to expedite the return of PC 1.2. Transition 1: Continued frequent fires and non-natural grazing by livestock and non-native wildlife can place a stress on PC 1.3. This pressure can give an advantage to encroaching non-native plant species and may lead to the invasion of non-native annual grasslands.

State 5
Plant Community 2.2

Community 5.1
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 Channel Island mixed chaparral will recover and grow after a fire, which will eventually lead back to PC 2.1. Community Pathway 2.2a: 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 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. Community Pathway 2.2b: The shift from PC 2.2 to PC 2.3 will take place under

continued grazing or frequent fires (less than 10 year intervals). These disturbances will hinder the new growth of shrubs, leading to a state dominated by non-native annual grasses and forbs.

State 6
Plant Community 2.3

Community 6.1
Plant Community 2.3

If frequent fire or heavy grazing continually impacts this site, the regeneration and growth of the shrubs will be greatly hindered. This will lead to a site dominated by non-native annual grasses and forbs. Community Pathway 2.3: The transition from PC 2.3 back to PC 2.2 could occur after an extended time without disturbance, and in conjunction with restoration efforts. Transition 2: Continual grazing as well as frequent fires occurring more often than the natural range could transition PC 2.3 into a long term state.

State 7
State 3 - Plant Community 3.1

Community 7.1
State 3 - Plant Community 3.1

This state is dominated by non-native annual grasses and forbs with no Channel Island mixed chaparral present. Extensive restoration efforts could transition this state back to PC 2.2.

Additional community tables

Table 5. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)
Shrub/Vine					
1	**shrubs**			600–1600	
	Channel Island scrub oak	QUPA6	*Quercus pacifica*	300–600	–
	toyon	HEAR5	*Heteromeles arbutifolia*	100–400	–
	hollyleaf cherry	PRIL	*Prunus ilicifolia*	100–200	–
	island manzanita	ARIN2	*Arctostaphylos insularis*	100–200	–
	summer holly	CODI3	*Comarostaphylis diversifolia*	50–150	–
	lemonade sumac	RHIN2	*Rhus integrifolia*	50–150	–
	island ceanothus	CEMEI2	*Ceanothus megacarpus var. insularis*	20–50	–
	island mountain mahogany	CEMOB	*Cercocarpus montanus var. blancheae*	20–50	–
Forb					
2	**forbs**			10–70	
	Cucamonga manroot	MAMA8	*Marah macrocarpus*	1–30	–
	southern bush monkeyflower	DILO6	*Diplacus longiflorus*	1–15	–
	climbing bedstraw	GANU	*Galium nuttallii*	1–15	–
	heartleaf keckiella	KECO	*Keckiella cordifolia*	1–5	–
	white fairy-lantern	CAAL2	*Calochortus albus*	1–5	–
	Trinity penstemon	PETR	*Penstemon tracyi*	1–5	–
	goldback fern	PETR7	*Pentagramma triangularis*	1–5	–
Grass/Grasslike					
3	**grasses**			1–50	
	foothill needlegrass	NALE2	*Nassella lepida*	1–20	–
	smallflower melicgrass	MEIM	*Melica imperfecta*	1–10	–
	roundfruit sedge	CAGL7	*Carex globosa*	1–5	–

Inventory data references

The following NRCS plots were used to describe this ecological site.

Hobo site #1
SCV-112 % site location
SC-328 lbs with pines.

Type locality

Location 1: Santa Barbara County, CA	
UTM zone	N
UTM northing	3766980
UTM easting	242943
General legal description	The site location is on Santa Cruz Island, south of the Canada de la Portezuela Road. It is up the drainage from a large rock wall crossing.

Other references

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Uchytil, Ronald J. 1991. Cercocarpus betuloides. 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/ [2005, June 29].

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):**

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:**
