Ecological site group F004BN103CA
Upper elevation mountain slopes

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Key Characteristics

- Santa Cruz Mountains – LRU N
- Other mountain slopes

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.

Physiography

This ESG occurs on uniform to convex summits and shoulders of broad ridges and concave to convex positions of mountain slopes in LRU N. These mountain slopes are sloping to very steep, with elevations just over 3000 ft.

Climate

The average annual precipitation in this MLRA is 23 to 98 inches (585 to 2,490 millimeters), increasing with elevation inland. Most of the rainfall occurs as low-intensity, Pacific frontal storms. Precipitation is evenly distributed throughout fall, winter, and spring, but summers are dry. Snowfall is rare along the coast, but snow accumulates at the higher elevations directly inland. Fog is a significant variable that defines this MLRA from other similar MLRAs. Summer fog frequency values of greater than 35% are strongly correlated to the extent of coast redwood distribution, which is a primary indicator species in this MLRA. Nighttime fog is approximately twice as common as daytime fog and seasonally, it reaches its peak frequency in early August, with the greatest occurrence of fog from June through September (Johnstone and Dawson 2010). The average annual temperature is 49 to 59 degrees F (10 to 15 degrees C). The freeze-free period averages 300 days and ranges from 230 to 365 days, decreasing inland as elevation increases.

Climate varies from the west to the east in LRU N, the Santa Cruz Mountains, as the high mountain ridges reduce the penetration of maritime air. Winters are cool and wet with the occasional snowstorms. Heavy rains cause mudslides throughout this LRU, and on the west side, summers are cooler, and fog or low overcast skies are only around for the mornings and carry through the low slopes and stream terraces but do not reach high elevations in this ESG.

Soil features

Although Douglas-fir can grow on a variety of soils, the soils most associated with this concept are primarily found on comprised of colluvium and residuum materials derived from sandstone, metavolcanics, and sedimentary and metamorphic rocks, with soils that range from lithic and paralithic to very deep in some locations and are primarily well-drained.

Representative soils for this concept are Skyridge and Casrock. They are both mesic Ultic Haploxerolls, with Casrock being loamy-skeletal with a pachic horizon and Skyridge being loamy on lithic soils.

Vegetation dynamics

This provisional ecological site concept attempts to describe the Douglas-fir dominated mountain slopes that can be found within this LRU. This concept is primarily supported through literature and available information online regarding these habitats. This provisional ecological site concept covers the mountains within the LRU that receive

hot, dry, summers where the fog doesn't reach and therefore is too dry to support a dominant overstory of redwoods. Future work will need to be done to better understand the soil and site characteristics that drive the vegetation expression for this provisional ecological site concept.

Abiotic Factors

Pseudotsuga menzeisii (Douglas-fir) dominated forests are extensive in this LRU as you move east away from the coastline. Elevation limits coastal fog in this LRU, leaving the highest and most exposed mountain slopes where this ESG occurs too dry and hot in the summers for coast redwoods.

Precipitation significantly drops from the LRUs north of San Francisco, averaging between 40-60 inches, which also has a significant impact on the dominance of Douglas-fir over coastal redwoods in this LRU. This provisional concept includes areas that may still have coastal redwoods as a component of the overstory, however the coastal redwoods will not be a dominant and cannot regenerate from seed once removed from the system.

Douglas-fir is a large, coniferous, evergreen tree. These trees commonly live more than 500 years and occasionally more than 1,000 years. Old individuals typically have a narrow, cylindric crown beginning 65 to 130 feet (20-40 m) above a branch-free bole. It often takes 77 years for the bole to be clear to a height of 17 feet (5 m) and 107 years to be clear to a height of 33 feet (10 m). In wet coastal forests, nearly every surface of old-growth Douglas-fir in this ecological site is often covered by epiphytic mosses and lichens (Uchytil, 1991). This tree's rooting habit is not particularly deep. The roots of young Douglas-fir tend to be shallower than roots of many of the same aged conifers like ponderosa pine, sugar pine, or incense-cedar. Some roots are commonly found in organic soil layers or near the mineral soil surface.

This ESG is dominated by a multi-tiered canopy of Douglas-fir, tanoak and other hardwoods. Hardwoods readily establish after disturbance and may dominate the overstory for several decades post-disturbance. Fallen logs are an essential part of this ecological site, providing significant habitat for wildlife species and conifer recruits.

Primary Disturbances

Fire is likely the principal disturbance, however, the historic frequency of fires and their impact to this high coastal mountain elevation site remains difficult to ascertain. Lightning-ignited fires are considered somewhat rare relative to the rest of California, but lightning strikes do occur with fair regularity in the Santa Cruz Mountains (Van Wagtendonk and Cayan, 2008). Native American burning is thought to have played a major role in most areas of the Central Coast for many centuries (Greenlee and Langenheim, 1990, Stephens and Fry, 2005).

Fires alter the composition of shrubs and forbs in the understory community. Fires expose the soil and reduce competition from other plants, thereby enabling establishment of many species. Many species in this ESG are able to resprout vigorously from the root collar or burls after fire and can quickly attain dominance on a site following fire and persist for many decades. Hardwood species in this ESG are often top-killed by fire, though larger stems may survive with only basal wounding if fire intensity is low. After relatively intense fire, a decrease in plant canopy cover is common, and is followed by a quick rebound in cover by resprouting hardwoods and shrubs.

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Major Land Resource Area

MLRA 004B

Coastal Redwood Belt

Stage

Provisional

Contributors

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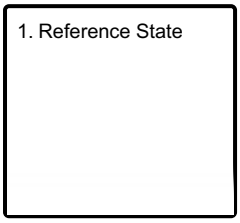
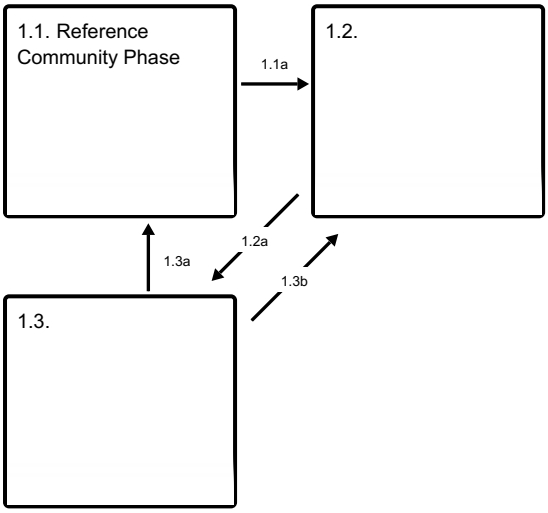
State and transition model

Ecosystem states



State 1 submodel, plant communities



State 1
Reference State

The dynamics described below are general to the level that the site concept has been developed for provisional ecological site concept identification and further investigation purposes only. It is meant to give a general overview of the ecological dynamics of the system and should not be viewed as a model for a specific ecological site level management. It is supported by the current available literature that was reviewed for a general understanding of the system and basic understanding of the abiotic and biotic drivers. Further investigations and soil-site data collection and analysis should be conducted before specific land management can be applied at the ecological site specific scale. This STM only serves to explain the general ecology and dynamics. No alternative states were found during the literature review, however that does not mean they do not exist and more time should be spent determining whether or not this model captures all the dynamics of this system, especially once more is known about the soil-site characteristics of this LRU and ecological site concept. Reference State (State 1) – The reference state for this provisional ecological site concept is dominated by Pseudotsuga menzeisii (Douglas-fir), with a significant component of *Notholithocarpus densiflorus* (tanoak) and other hardwoods. *Sequoia sempervirens* (coast redwood) may still be present in the canopy, however in significantly lower amounts. *Arbutus menziesii* (Pacific madrone), *Chrysolepis chrysophylla* (giant chinquapin), and/or Umbellaria californica (California laurel) can also be found in the mix with tanoak in the subcanopy across much of this provisional ecological site concept. The ecological dynamics represented in the reference state are driven primarily by periodic fires that create the complex dynamics and plant expressions reflected by the community phases described. Depending on the intensity, severity, timing, and weather conditions associated with each fire and which community phase is impacted by the fire, this ecological site will respond to varying degrees. At this very general scale, this reference state only really captures

the generalities related to the functional groups that are most dominant and does not capture the more specific dynamics and patterns that would be found at the more detailed and refined ecological site scale that focuses on specific abiotic factors that drive some of these various complex plant expressions. More data and refinement is needed to capture the information needed in order to make specific land management decisions at the ecological site-component scale.

Community 1.1
Reference Community Phase

The reference community phase is characterized by an overstory community dominated by Douglas-fir, with a cover of tanoak in the sub-canopy and redwood is generally present in significantly lesser amounts in the western portions of this provisional ecological site concept. The understory is sub canopy is also dominated by *Arbutus menziesii* (Pacific madrone), *Chrysolepis chrysophylla* (giant chinquapin), and/or Umbellaria californica (California laurel). Cover of grass and forbs are very low. Douglas-fir needs disturbance and enough sunlight to reproduce successfully.

Community 1.2

This community phase is dominated by tanoak and other hardwoods, and a variety of pioneering species. Tanoak grows rapidly in the created openings. If the site is left to develop over time, tanoak will form a tree layer and Douglas-fir will begin to infill from surrounding seed sources. Tanoak is fast growing and will dominate the site and compete with regenerating Douglas-fir for decades.

Community 1.3

Over several decades, Douglas-fir will successfully exceed the height of the hardwoods and become firmly established in the overstory. Following several decades of growth, Douglas-fir will dominate the overstory of this community phase and tanoak will occupy the subcanopy and understory.

Pathway 1.1a
Community 1.1 to 1.2

The reference community may transition to Community Phase 1.2 following a significant fire that removes the conifers and hardwoods from the canopy and allows the understory shrubs to dominate for a time as the hardwoods re-establish.

Pathway 1.2a
Community 1.2 to 1.3

With time, Douglas-fir should gradually re-establish and will eventually take over dominance once again in the upper most canopy layer.

Pathway 1.3a
Community 1.3 to 1.1

As the Douglas-fir creates a heavier shaded canopy, redwood may begin to re-establish from nearby seed sources in the western portions of this site concept and with time and no major disturbance, become a minor part of the canopy again.

Pathway 1.3b
Community 1.3 to 1.2

A significant fire that removes the conifers and hardwoods from the canopy and allows the understory shrubs to dominate for a time as the hardwoods re-establish.

Citations