Ecological site group F004BM101CA
Protected ravines slopes and stream terraces

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Key Characteristics

- West of the San Andreas fault line on the Pacific Plate – LRU M
- Protected ravines and footslopes

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 is mostly confined to the protected ravines, footslopes, and high stream terraces of LRU M where the coastal fog remains for the longest duration of time during the year and throughout the hot summers. Slopes range from 30-75% at elevations from 50 to 1700 ft.

Climate

The mean annual precipitation is about 30-50 inches, with average annual temperatures between 50 and 57 degrees F. Frost-free days are between 275 and 360 days.

The Point Reyes/Farallon Islands LRU includes the Point Reyes Peninsula, Bodega Head and the sand spit at the north end of Bodega Bay, and the offshore Farallon Islands. The maritime climate is temperate and humid, and fog often occurs. Heavy coastal winds are an influential factor in vegetation expression in this LRU that occur primarily in the summer months, explaining the large extent of coastal prairies and coastal scrub species along much of the coastline. Where trees are present along or near the coastline and within the reach of these heavy winds, the tree canopies form unidirectional windswept crowns.

Soil features

The soils of this ESG are variable, but where this ecological site can be correlated to soils that have been mapped, the soils are isomesic, udic, loamy-skeletal alfisols on residuum weathered from sandstone. The cooler, maritime temperatures and protected aspects allow for higher retention of soil moisture during the hotter summer days, and the fog influence provides key moisture to the redwood foliage and soil moisture content as well.

A representative soil for this ESG would be Dipsea and Cronkhite soils. They are deep, well drained or moderately well drained soils with a loam or gravelly loam surface and clay loam subsoil. Both soils are underlain by weathered sandstones and shales.

Vegetation dynamics

This provisional ecological site concept attempts to describe the small remaining areas of coastal redwoods of this small LRU. This concept historically would have covered many other areas within this LRU, however land use and increases in overall temperature over the past 100 years have made it difficult for coast redwood to re-establish into much of its previous habitat, confining it down to areas that are not conducive to urban sprawl and maintain protection from late afternoon heat in the summers.

Abiotic Factors

This ecological site is generally found directly adjacent to the mountains of MLRA 15. It site is generally found below 1000 ft. and the primary factors that maintain these sites in coast redwood are the fog influence, protected slopes and northerly aspects that maintain higher soil moisture during the warm periods of the summer.

Primary Disturbances

Historically, the primary disturbance to this provisional ecological site concept was lightning-ignited fires, timber harvesting for settlement in San Francisco, and Native American burning. Lightning-ignited fires occur in coastal California and habitats of LRU M and MLRA 15 would have burned repeatedly over time across many soil types and landforms. Between soil and landform differences and frequencies and intensities of burning that would interact with interannual weather patterns, cultural burning and lightning storm events, this would have created a patchwork of areas with varying stages of vegetation structure and composition.

Timber harvesting during the gold mining era in California removed a lot of the old growth redwoods in the mountains that surround San Francisco. It's strong, straight wood and height made it a prime species for harvest. Historically, the reference state for this ecological site would likely have been much more extensive before the harvesting of trees that were as easily accessible as they are in near proximity to San Francisco. As the fires became less and less frequent and harvesting slowed, redwood has re-established dominance in areas that were not as heavily impacted by the coastal winds and winter storms.

Major Land Resource Area

MLRA 004B
Coastal Redwood Belt

Stage

Provisional

Contributors

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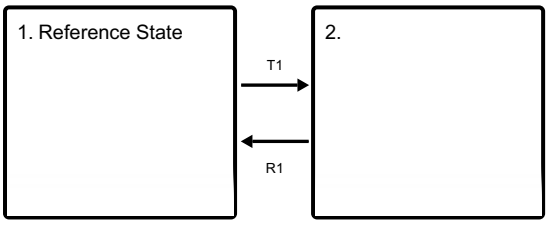
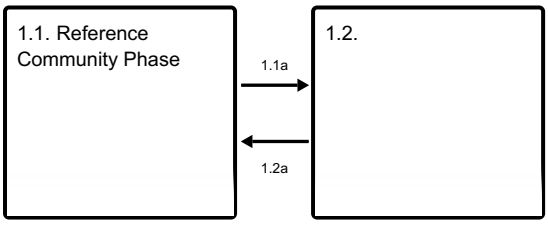
State and transition model

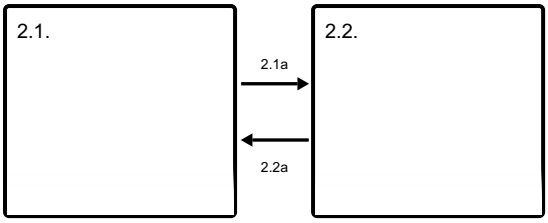
Ecosystem states



State 1 submodel, plant communities



State 2 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. Reference State (State 1) – This reference state includes a simple dynamic between the coast redwood forest and patchwork of shrubs and perennial grasses and forbs. These communities are confined primarily to areas protected from the heavy coastal winds and winter storms that are common to this LRU, and within the lower elevation areas that commonly experience fog in the summer time. Historically, this reference state would have been primarily represented by Community Phase 1.1, but today it is mostly reflected by Community Phase 2.1 or 2.2.

Community 1.1
Reference Community Phase

This community phase represents the areas of LRU M that have a coast redwood dominated forest. It is dominated primarily by Sequoia sempervirens (coast redwood), with the occasional Pseudotsuga menzeisii (Douglas-fir) and a second canopy of hardwoods such as *Notholithocarpus densiflorus* (tanoak) and Arbutus menzeisii (Pacific madrone). The understory is varied, however the dominant species are *Vaccinium ovatum* (California huckleberry), *Polystichum munitum* (swordfern) and *Oxalis oregana* (redwood-sorrel).

Community 1.2

This community phase represents the shrubs and herbaceous vegetation expression after fire or timber harvest, and in smaller areas from windthrow. There is little information available about the specific species that dominate this redwood ecological site and more information is needed to describe this community phase.

Pathway 1.1a
Community 1.1 to 1.2

This pathway occurs after harvesting or a fire that is sufficient enough to remove most of the woody species and open the canopy and soil resources to the shrub and herbaceous species. In smaller areas, windthrow may create a more open, patchy dynamic where shrubs dominate due to the opening in the canopy.

Pathway 1.2a
Community 1.2 to 1.1

This pathway occurs over time as the redwoods re-establish or encroach into the grasslands where fire has been removed. This pathway may also be hastened during periods of excessive moisture that favor the trees over the herbaceous plants.

State 2

This state represents the community phases that have been invaded by non-native species. This ecological site is relatively resistant to outside pressures like herbaceous invasive species, especially in Community Phase 1.2 after

a fire has occurred. Non-natives and invasives are able to capitalize quickly on available resources much better than the native species can, especially during years that are hotter and drier than average. This state is based on limited observational information and should be further investigated in the field for better data and refinement of the concepts and dynamics.

Community 2.1

This community phase represents the Douglas-fir-redwood forest that dominates this state. Redwood no longer is the dominant overstory species, due to the current stresses and pressures on this confined and limited site within LRU M. Although redwood may return to the site over time, conditions are not conducive to redwoods re-asserting dominance in the overstory.

Community 2.2

This community phase represents all the different community expressions of an invaded state. The primary annual grass species include *Bromus diandrus* (ripgut brome) and *Avena fatua* (wild oat), and the most common forbs include Carduus pycnocephala (Italian plumeless thistle), *Silybum marianum* (milk thistle), *Hirschfeldia incana* (shortpod mustard), and *Raphanus raphanistrum* (wild radish). This community phase may also be a mixture of native and non-natives, perennials and annuals, depending on the site and soil conditions.

Pathway 2.1a
Community 2.1 to 2.2

This pathway occurs after harvesting or a fire that is sufficient enough to remove most of the woody species and open the canopy and soil resources to the shrub and herbaceous species.

Pathway 2.2a
Community 2.2 to 2.1

This pathway occurs over time as the Douglas-fir and redwoods re-establish or encroach into the grasslands where fire and grazing have been removed. This pathway may also be hastened during periods of excessive moisture that favor the trees over the herbaceous plants.

Transition T1
State 1 to 2

This transition occurs when the non-native or invasive seed source is introduced to the ecological site. This ecological site is relatively resistant to outside pressures like herbaceous invasive species, and is most susceptible to this invasion in Community Phase 1.2 right after fire has occurred. The threshold is crossed when feedback mechanisms shift from natural dynamics to feedback mechanisms that cater to the invasive species.

Restoration pathway R1
State 2 to 1

This restoration pathway occurs through the planting of redwoods and the control of invasive species that can potentially restore this ecological site to its reference state. It is more likely that the invasions are minimized and controlled, but complete removal of the invasives may not be possible without significant time and money inputs and repeated treatments.

Citations