Ecological site group F004BI105CA Magnesic Mountain Slopes

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Key Characteristics

- Heavy coastal fog dominates the landscapes below 1500 ft.
- Soil moisture is udic LRU I
- Serpentine parent material

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 found on mountains and ridgetops from approximately 980 - 3300 ft in LRUs I and J on slopes from 5 to 50%.

Climate

The average annual precipitation in this MLRA is approximately 70 inches, 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 low mountains of the Northern Franciscan Redwood Forest LRU I, lie entirely within the coastal fog zone and are characteristically covered by fog-dependent coast redwoods and Douglas-fir. Historically, unbroken redwood forests occurred and moderated local climate by trapping coastal fog and producing shade. The combination of shade, root competition, young soils with a deep organic debris layer on the soil surface, occasional fire, and silting by floods limits the number of plant species that occur here. The region extends north only about 10 miles into Oregon near Brookings. Dominated by conifers, the region also includes Sitka spruce, western hemlock, western redcedar, Port Orford cedar, and grand fir. Hardwoods such as red alder, Pacific rhododendron, and tanoak commonly occur. This LRU also includes the areas known as the Bald Hills that have been maintained for over 100 years as prairies and oak woodlands through prescribed fire. These hills are dominated by Oregon white oak and perennial and annual native and non-native grasses and forbs but are actively encroached by Douglas-fir and redwood. Fine and fine-loamy, udic, isomesic, Ultisols and Alfisols are typical. In some factors, this region has more similarities to the temperate rain forests of the Oregon and Washington Coast Ranges, however since it does not receive winter snow and colder temperatures and still maintains the distinct presence and dominance of coast redwood make this LRU unique to MLRA 4B.

Soil features

The soils most associated with this concept are very deep, well drained soils that formed in colluvium and residuum derived from serpentine. Cedarflats and Salmonfalls soils are the primary soils correlated to this provisional site concept and are found on mountains and ridges that range from 5 to 50 percent slope. The more minor soil related to this site is the Cedarflats soils, which are more common on the ridges and have a very abrupt boundary at the

serpentine contact. Large roots can be seen growing parallel along this abrupt boundary, indicating the plants adaptation to the soil conditions of serpentine soils.

Vegetation dynamics

This provisional ecological site concept describes the small pockets of jeffrey pine and incense cedar dominated serpentine soils on mountain slopes that can be found within LRUs I and J. This ecological site is similar or synonymous with serpentine areas in the western edge of MLRA 005X such as Horse Mountain and Lassics Botanical Areas (Humboldt/Trinity Counties), and North Fork Smith River Botanical Area (Del Norte County). This concept is primarily supported through literature and limited soil/vegetation observations. 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.

Vegetation is unique and production limited in this LRU due to the restrictive nature of the serpentine parent materials that create challenging growing conditions for many plants. Often, these areas appear to mimic drier forest types in LRUs further east and further from the ocean. The mean annual precipitation is about 70 inches (1780 mm) and the mean annual temperature is about 55 degrees F (13 degrees C). Ultramafic bedrock is characterized by its low Ca:Mg ratios and high heavy metal accumulations and is thus toxic to many plants; it is usually associated with stunted growth or reduced productivity. The influence of soil chemistry is readily apparent by virtue of its influence on vegetation composition, production, and species distribution. The plant communities in this ecological site are strikingly different than the adjacent non-serpentinite derived soils, as would be expected in a serpentinite area (McGahan et al., 2009; Kruckeberg, 1984).

The vegetative expression in this ecological site consists of Jeffrey pine with a scattered understory of *Ceanothus prostratus* (prostrate ceanothus) and perennial grasses and forbs. *Calocedrus decurrens* (incense cedar) can also be found on this site, however it is limited in cover of the overstory. Several less common and endemic plants occur within this provisional ecological site concept, but are not described for the purposes of this effort.

The main controlling factor in soils forming in ultramafic parent material is the chemical composition. The overwhelming abundance of extractable Mg at the cation exchange sites (at the expense of extractable Ca (Brooks, 1987)) prevents many plants from establishing. In addition to very low Ca:Mg ratios, serpentinite, dunite, and perioditite contain elevated levels of heavy metals (Woodruff et al., 2009), Ni Mn, etc. The chemical composition is often heterogeneous in distribution, often due to subtle changes in geology, but also topographical differences. Kruckeberg (1984) outlined vegetative response to ultramafic conditions: plants are 1) endemic to serpentine (restricted), 2) not restricted (e.g. local indicators), 3) indifferent to serpentine (Bodenvag), and 4) excluded from serpentine (e.g. redwood).

Ultramafic soils have been thought to be refuges for native endemics as well as perennial bunchgrasses (Kruckeberg, 1984) which might have been more abundant in the historical state.

Primary Disturbances

Fire is the principal disturbance agent that impacts this provisional ecological site concept. Lightning-ignited fires and Native American burning played a major role across most of the coast and coastal mountains of California. Fires were likely quite frequent in many examples of this ecological site, though research is somewhat sparse due to the severely limited extent and remote, difficult to reach locations where it occurs.

Very little is known about this provisional ecological site concept at this time and there was limited to no research easily available to attribute to this very small site (<400 acres) and its ecological dynamics. More information is needed to understand this site concept in order to assist in land management decisions on this unique site.

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Major Land Resource Area

MLRA 004B Coastal Redwood Belt

Subclasses

F004BI105CA–Magnesic mountain slopes

Stage

Provisional

Contributors

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State and transition model

Ecosystem states

1. Reference State

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 *Pinus jeffreyi* (Jeffrey pine), with a minor overstory component

of *Calocedrus decurrens* (incense cedar) and *Ceanothus prostratus* (prostrate ceanothus) in the understory with a significant component of perennial grasses and some forbs. The ecological dynamics that drive the reference state are primarily from periodic fires. At this very general scale, this reference state only really captures the generalities related to the provisional ecological site concept as a whole and does not capture the more specific dynamics of the various community phases and states possible, due to the limited information currently available. 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 Jeffrey pine, with a minor overstory component of incense cedar. The understory is primarily dominated by prostrate ceanothus and perennial grasses and forbs.

Dominant plant species

- Jeffrey pine (Pinus jeffreyi), tree
- incense cedar (Calocedrus decurrens), tree
- prostrate ceanothus (Ceanothus prostratus), shrub

Citations