Ecological site group F004BL102CA
Salt-affected marine terraces with eolian sand parent materials

Last updated: 03/07/2025
Accessed: 05/10/2025

Key Characteristics

- Elevated coastal plains
- Dissected coastal plateaus with high acidity – LRU L
- Sea spray has a dominant influence on the soils and vegetation
- Soils without an E horizon present or strongly acidic.
- Eolian sands derived from sandstone parent materials

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 a unique area within LRU L found on wave cut marine terraces that experience salty coastal winds and have eolian parent materials overtop of sandstone and are moderately to well drained.

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.

Soil features

This ESG covers the wide variety of eolian sand dominated marine terraces that are generally moderately to well drained, strongly acidic, with an effective rooting depth that ranges between less than 40 to greater than 60 inches.

Representative soils are Caspar, Quinliven, Gibwell, Gibney and Ferncreek, and the effective rooting depth is limited by saturation between the depths of less than 40 inches to greater than 60 inches for brief periods following episodes of heavy rain from December through April.

Vegetation dynamics

This ESG attempts to describe the basic understanding of the terraces of LRU L that have a significant eolian sand deposit overlying the sandstone and are within close proximity to the coastline, experiencing heavy, salt-laden coastal winds. This concept is primarily supported through literature and available information from the Mendocino County Survey . This concept occurs at lower elevations that spend long periods within summer coastal fog. This site is associated with both F004BL100CA and F004BL101CA but occurs in areas that are better drained. This has a significant impact on the vegetation composition and increases vegetation production relative to more poorly drained sites. 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

Vegetation expression appears to be strongly correlated to the effective rooting depth. *Pinus muricata* (Bishop pine), *Sequoia sempervirens* (coast redwood), Pseudotsuga menzeisii (Douglas-fir) and *Notholithocarpus densiflorus* (tanoak) dominated forests will be found on the soils with an effective rooting depth greater than 60 inches. While the Bishop pine and Arctostaphylos spp. (manzanita) forests dominate the soils with an effective rooting depth between 40 and 60 inches and the soils that have a saturated zone that starts between the depths of 24 and 48 inches and extends to a depth of more than 60 inches are typically the soils where *Vaccinium ovatum* (California huckleberry) becomes a more significant component of the understory with the Bishop pine and manzanita. *Pinus muricata* (Bishop pine) dominates younger, nutrient poor eolian sediments that are well drained and acidic.

The site is found at elevations below 1,000 feet between the ocean and the first main north-south ridge where frequent heavy summer fog is intercepted by a tree canopy. Soils have water available for plant growth most or all of the year, and average soil temperatures at a depth of 20 inches vary by less than 5 degrees C between summer and winter.

Primary Disturbances

The primary disturbance to this ecological site is urbanization and human developments that either de-water the site or completely obliterate it. Fire plays a prominent role in the life history and reproductive patterns of bishop pine, which is a prominent species in this ESG. Bishop pine is a serotinous, closed cone species, meaning some or all of its cones are locked shut until high heat loosens the resin coating the cones, unlocking seed chambers and allowing seed to be dispersed in large quantities following fire. Similar to other closed cone species, fires in bishop pine forests are often high intensity and stand replacing, though serotiny tends to be less pronounced in the northern portion of this species' range (Cope, 1993). This fire relationship is suggestive of historic fire occurrence in this ESG, but the frequency of fire among the bishop pine in this area is unclear and not well studied. Historically, fires caused by a mix of lightning, tribal burning and early ranching were common in coastal mountains of northern California.

Citations

Cope, Amy B. 1993. *Pinus muricata*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: https://www.fs.usda.gov/database/feis/plants/tree/pinmur/all.html [2025, March 6].

Major Land Resource Area

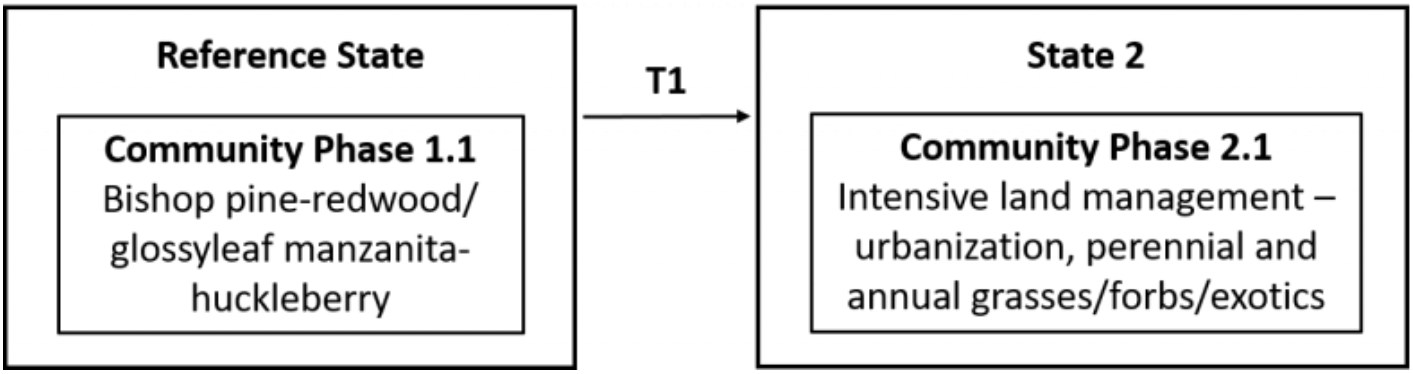
MLRA 004B
Coastal Redwood Belt

Stage

Provisional

State and transition model

F004BL102CA – Salt-affected marine terraces with eolian sand parent materials



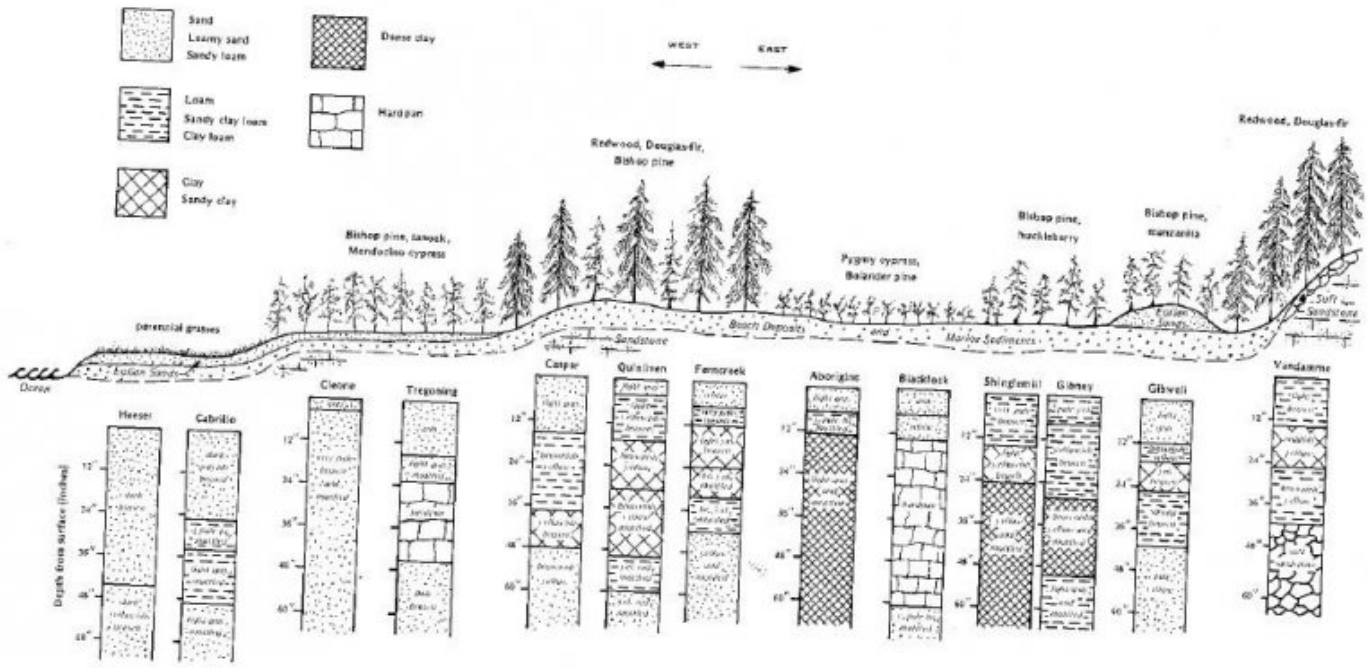


Figure 10.—Idealized illustration of the general relationships among marine terrace soils. This simplified cross-section is typical of the marine terraces near the town of Caspar. The width of the terrace system, from the ocean on the west to the mountainous uplands on the east, is approximately 4 miles at this location. Other cross-sections of the terrace system would reveal different combinations of soils. The upper terrace in this diagram represents perhaps three or more terrace levels. The diagram is not to scale.

State 1
Reference State

The dynamics described below are extremely 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 ESG is dominated by *Pinus muricata* (Bishop pine). This reference state captures the various vegetation expressions typical on the wave cut terraces of LRU L that have a significant amount of eolian sand overtop the sandstone bedrock. In areas of this site concept that are less than 40 inches to saturation they are

typically dominated by *Pinus muricata* (Bishop pine), Vaccinium spp. (huckleberry) and *Arctostaphylos nummularia* (glossyleaf manzanita), in areas between 40 and 60 inches are typically dominated by Bishop pine and glossyleaf manzanita, and in the areas where depth to saturation is beyond 60” typically, a more complex expression of Bishop pine, *Sequoia sempervirens* (coast redwood), Pseudotsuga menzeisii (Douglas-fir) and *Notholithocarpus densiflorus* (tanoak) dominate. Variation within this reference state relates primarily to depth to soil saturation. Redwood and Douglas-fir will also likely be more present in the areas that are most protected from the salt-laden coastal winds within this provisional ecological site concept. At this very general scale, this reference state only really captures the generalities related to the dominant functional group that is 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 within this unique site concept. 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.

State 2

This state represents the intensive land uses that have significantly altered this ESG in a myriad of ways including removal of topsoil, fertilizer additions and other topsoil manipulations, hydrologic alterations that remove native soil fauna, among many other things and is typically due to urban developments, recreational activities, and intensive agriculture. More information about this state is needed to flesh out the various impacts these types of land uses/alterations have had on the ecological site in order to better understand how to manage these areas or potentially attempt restoration of these areas where possible.

Community 2.1
Intensive disturbance

This community phase represents all the varied land uses that significantly alter this vegetation expressions of this ESG. This represents at this time, the extremely varied community phases that will include all types of alterations/land uses that so significantly alter the ecological site that it is permanently changed and no longer has typical or even representative ecological dynamics. Land use models would be an appropriate option to develop these types of variations in altered landscapes. At this scale of grouping, specific drivers and triggers and expressions of communities is too varied and broad to be more specific. More data collection and field verification is necessary.

Transition T1
State 1 to 2

This transition is caused by significant human alterations that remove essential top soil horizons for housing developments or urban infrastructure and force this ecological site over a threshold and change the function and structure of this site in extensive ways.

Citations