Ecological site group R004BL200CA
Windy coastal perennial grassland terraces and bluffs

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Key Characteristics

- Elevated coastal plains
- Dissected coastal plateaus with high acidity – LRU L
- Soils that support upland perennial rangelands

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 encompasses the varied expressions of perennial grasslands that can be found within LRU L. They are found on the mountains and fluviomarine terraces within the coastal fog influence. Slopes are varied, and aspect does not appear to play a role at this scale.

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. Nightime 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.

The Fort Bragg/Fort Ross Terraces form an elevated coastal plain that has less relief (200-800 feet) than the adjacent low elevation mountains of LRU K. Monthly and annual temperature variations are minimal and summer fog is common.

Soil features

Although the soils of this provisional site concept are highly varied, they all share the common variable of high salt content and almost all are found on Mollisol soils that have thicker, more organically rich horizons than those of the coastal scrub sites to the south and inland from the coast. The cooler, maritime temperatures allow for more soil moisture during the hotter summer days, and the organic matter turnover is greater in these scrub and prairie communities as a result.

The soils found on the mountains and upland landforms are most represented by Abalobadiah, Bruhel and Vizcaino. These are all isomesic, typic fine-loamy or loamy soils that are in the Argiustoll family. These soils all have a water table at greater than 72 inches.

The soils on the fluviomarine terraces and river valley stream terrace landforms are most represented by Boontling, Mallopass, and Windyhollow which are thermic or isomesic, typic fine-loamy, fine or coarse-loamy textures and are in the Argixeroll and Argiustoll families. These soils also have a water table from approximately 21 - 60 inches.

Vegetation dynamics

This provisional ecological site concept attempts to describe the coastal scrub and coastal prairies of this small LRU. They exist in a continuum of herbaceous to dense woody shrub cover wherever the cooling influence of the Pacific Ocean moderates the summer drought (high evapotranspiration rates). This concept lumps many of the unique scrub and prairie expressions into one large concept, due to limited soil mapping that successfully parses out the differences between these types and focuses primarily on the primary abiotic factors and ecological dynamics that maintain and/or alter these vegetative communities. The extent of this ecological site concept stretches along the coastline from approximately Fort Bragg to Bodega Bay. This provisional ecological site concept covers a wide variety of coastal scrub and prairie dynamics and expressions that will need to be further refined to better represent dynamics on a smaller, more ecologically specific scale.

Abiotic Factors

This ecological site is generally found between the coastal strand and redwood and Douglas-fir forests of LRU K. This site is generally found below 800 ft. on the low coastal terraces and bluffs adjacent to the coastal strand and beaches. The primary factors that maintains these sites in either coastal scrub or coastal prairie are the moist, organic-rich soils that also experience heavy, salt-laden winds that are common along this part of the coastline. Coastal scrub and herbaceous species are more readily able to colonize and stabilize and adapt to these heavy winds and salty conditions, which explains why they dominate these open plains and trees do not.

Primary Disturbances

The primary disturbances to this ecological site concept are the harsh, heavy salt-laden winds, grazing, and fire. Historically, lightning-ignited fires are thought to have occurred in the surrounding forested habitats every 30-135 years and with the winds, would have burned significant acres across many soil types and landforms. Between soil and landform differences and frequencies and intensities of burning that would be interacting with yearly weather patterns that shifted between wet years to drier years, this would have created a patchwork of areas that returned over time to forest while others remained in coastal scrub and grassland. It is also believed that native grazers were common in these lower gradient coastal plains and may have contributed to the open nature and complex patchwork of coastal scrub and prairies. In combination with the fires and periodic droughts, grazers may have assisted in maintaining areas with good soils in more herbaceous vegetation and the less ideal soils in a more coastal scrub and grass patchwork expression. Native American use along these coastlines would also have included burning to maintain as much of the coastal prairies as possible, often times quite frequently to improve hunting and grass and forb production for plant harvesting. Historically, this ecological site would likely have been much more extensively covered by the coastal prairies due to the repeated burnings by many of the coastal tribes and the scrub species would have likely been more confined to the rocky bluffs, steep slopes, and exposed ridges. As the fires became less and less frequent, the coastal scrub species was able to encroach back into the prairies and dominate much of the coastline. Areas where grazing still occurs either by livestock or native grazers, tend to maintain the open prairies, however they have become a mix of native perennials and forbs and annual grasses and forbs since the introduction of the non-native seed sources and heavy pressures from grazing. Fire to this ecological site is less likely now, due to the urban development and cultivation of much of these areas along the coast.

Major Land Resource Area

MLRA 004B
Coastal Redwood Belt

Stage

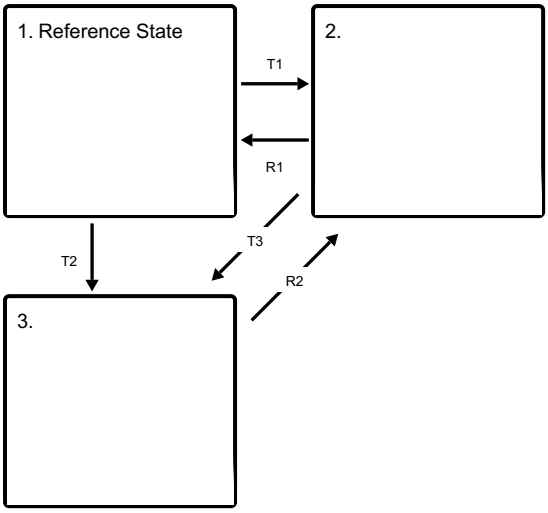
Provisional

Contributors

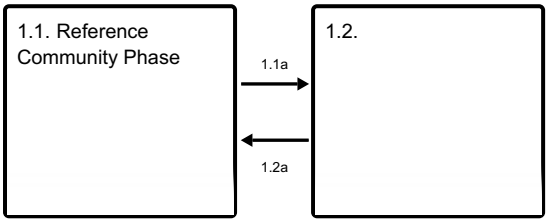
Kendra Moseley

State and transition model

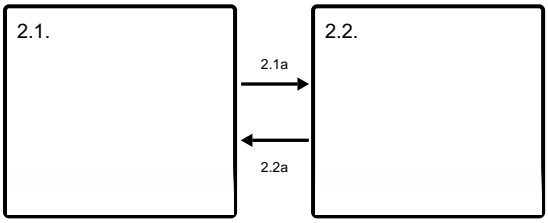
Ecosystem states



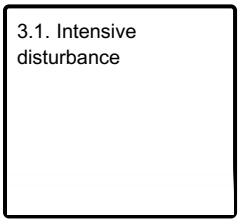
State 1 submodel, plant communities



State 2 submodel, plant communities



State 3 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 patchwork of coastal prairie dominated and coastal scrub dominated shrublands. These communities are all varied in size and extent, depending on the width of coastline available, elevation and slope, the geologic and soil substrates, and dynamics of disturbance. This variability requires further site investigation and field data collection to refine these communities to the appropriate ecological site scale for more specific site characteristics for each of these finer-scaled differences that have impacts on the land management decision-

making process. The coastal prairie is more dominant in this ecological site due to the infrequent fires, and reduction in grazing activities that would have assisted in keeping the coastal scrub species from encroaching into the prairies and dominating the overstory structure.

Community 1.1
Reference Community Phase

This community phase represents the more stable and resistant and resilient community phase dominated by perennial grasses and forbs and is most prevalent on these flatter coastal terraces where grazing practices assist in maintaining the herbaceous cover. Historically, the community phase was also maintained by more frequent fires by the Native Americans living along the coastline that were dependent on the food and materials the herbaceous communities provided. These grasslands can be found on varying slopes with well-developed mollic soils on the coastal terraces and bluffs that run along the narrow band of LRU L. This community phase is generally dominated by *Danthonia californica* (California oatgrass), Bromus californica (California brome), and Nasella pulchra (purple needlegrass) and some scattered *Baccharis pilularis* (coyotebrush).

Community 1.2

This community phase represents the coastal scrub dominated vegetation. These coastal scrub species are well-adapted to the high, frequent summer winds and salty air and are highly competitive and capable of capitalizing on the available resources of the cool, maritime climate in this LRU. Where the site characteristics create less ideal growing conditions, the coastal scrub species are likely to be more dominant and more consistently stable and resilient to disturbance. The most common species is *Baccharis pilularis* (coyotebrush), however there will be areas dominated by *Ceanothus thyrsiflorus* (blueblossom ceanothus), and *Lupinus albifrons* (silver bush lupine). Other species that are commonly found throughout this community phase include *Toxicodendron diversilobum* (poison oak), *Eriophyllum stoechadifolium* (seaside woolly-sunflower), *Scrophularia californica* (California figwort), *Polystichum munitum* (swordfern), *Artemisia californica* (Califonia sagebrush), and a variety of perennial and annual forbs.

Pathway 1.1a
Community 1.1 to 1.2

This pathway occurs slowly over time as coyotebrush continues to slowly creep from the prairie edges into the more central parts during seasons where moisture stress makes the herbaceous species less competitive, and may include periods of extended drought or extended periods without summer fog that is common to this LRU, creating drought stress to the herbaceous species that require sufficient summer soil moisture to survive the summer heat. Coastal scrub species, primarily coyotebrush, may capitalize on this drought-caused mortality.

Pathway 1.2a
Community 1.2 to 1.1

This pathway occurs after a fire or defoliation events by grazers (wild or domestic) that is sufficient enough to remove most of the woody species and open the canopy and soil resources to the herbaceous species.

State 2

Community 2.1

The community phase represents all the different community expressions of a non-native and/or invaded state. The primary annual grass species include *Bromus diandrus* (ripgut brome), *Poa pratensis* (Kentucky bluegrass), Danthonia pilosa (hairy oatgrass), Holcus lanata (velvet grass) and in some areas, *Anthoxanthum odoratum* (sweet vernal grass), Festuca arundinacea (tall fescue) and *Phalaris aquatica* (Harding grass).

Community 2.2

This community phase represents the coastal scrub dominated vegetation. These coastal scrub species are well-adapted to the high, frequent summer winds and salty air and are highly competitive and capable of capitalizing on

the available resources of the cool, maritime climate in this LRU. Where the site characteristics create less ideal growing conditions, the coastal scrub species are likely to be more dominant and more consistently stable and resilient to disturbance. The most common species is *Baccharis pilularis* (coyotebrush), however there will be areas dominated by *Ceanothus thyrsiflorus* (blueblossom ceanothus), and *Lupinus albifrons* (silver bush lupine). Other species that are commonly found throughout this community phase include *Toxicodendron diversilobum* (poison oak), and the annual grass species will fill the spaces with *Bromus diandrus* (ripgut brome), *Poa pratensis* (Kentucky bluegrass), Danthonia pilosa (hairy oatgrass), Holcus lanata (velvet grass) and in some areas, *Anthoxanthum odoratum* (sweet vernal grass), Festuca arundinacea (tall fescue) and *Phalaris aquatica* (Harding grass) and a variety of perennial and annual forbs.

Pathway 2.1a
Community 2.1 to 2.2

This pathway occurs slowly over time as coyotebrush continues to slowly creep from the prairie edges into the more central parts during seasons where moisture stress makes the herbaceous species less competitive, and may include periods of extended drought or extended periods without summer fog that is common to this LRU, creating drought stress to the non-native herbaceous species that require sufficient summer soil moisture to survive the summer heat. Coastal scrub species, primarily coyotebrush, may capitalize on this drought-caused mortality.

Pathway 2.2a
Community 2.2 to 2.1

This pathway occurs after a fire or defoliation event by grazers (wild or domestic) that is sufficient enough to remove most of the woody species and open the canopy back up and soil resources to the aggressive and competitive non-native herbaceous species.

State 3

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 3.1
Intensive disturbance

This community phase represents all the varied land uses that significantly alter this ecological site group. This is an extremely varied community phase that includes all types of alterations 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 occurs when the seed source is introduced to the ESG. This ESG is not highly resistant to outside pressures like non-native and/or invasive species. The threshold is crossed when feedback mechanisms shift from natural dynamics to feedback mechanisms that cater to the more competitive non-native and/or invasive species.

Transition T2
State 1 to 3

This transition is caused by significant human alterations that remove essential topsoil horizons, alter hydrologic functions, and/or add significant inputs that change soil chemistry and soil properties for housing developments,

urban infrastructures or intensive cropping systems and force this ecological site over a threshold and change the function and structure of this site in extensive ways.

Restoration pathway R1
State 2 to 1

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

Transition T3
State 2 to 3

This transition is caused by significant human alterations that remove essential topsoil horizons, alter hydrologic functions, and/or add significant inputs that change soil chemistry and soil properties for housing developments, urban infrastructures or intensive cropping systems and force this ecological site over a threshold and change the function and structure of this site in extensive ways.

Restoration pathway R2
State 3 to 2

This restoration pathway occurs only when significant time and money inputs are focused on areas that have not been permanently altered by urban developments. This restoration pathway may be more likely than R1, since most of these very altered landscapes will be more hospitable to non-native and invasive species than to the native species that are more particular and require specific growing conditions in the reference state that may not be replicable due to the alterations to the site that had occurred.

Citations