Ecological site group R004BA200CA
Beaches

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Key Characteristics

- Hydrologic processes dominate the landscape – LRU A
- Beaches and dunelands
- Beach sands and gravels, sparsely vegetated

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 the incipient and shadow foredune beaches within LRU A at or slightly above sea level. They range from no slopes to steeply sloping, depending on the winds and tides.

LRU A is primarily influenced by hydrological processes and contains beaches, dunes, rivers, and marine terraces below 400 feet elevation. Wet forests, lakes, estuarine marshes, and tea-colored (tannic) streams are characteristic features of this LRU. Marshes and wetlands have been widely altered and/or drained with many converted to agriculture and urban developments.

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.

Soil features

Soils found within this ESG are typically Oxyaquic isomesic udipsamments composed of beach sands and gravels, that are moderately well drained, permeability is rapid, and they experience very frequent flooding.

Vegetation dynamics

Beaches represent the leading edge of terrestrial continental vegetation; a long, narrow, interrupted band that supports sparse plant cover by species specially adapted to a harsh environment of sand, wind and salt. Many species occurring here are confined to the Beach and Beach Dunelands ESGs where other species struggle to survive. The extent of this ecological site concept stretches from the mean tide line to the top of the foredune or farthest inland reach of storm waves. They may have incipient structural forms that are influenced by the vegetation, such as sand shadows and hummocks that have not coalesced into true dunes.

Abiotic Factors

Wave action, salt spray, soil salinity, sea-water immersion and sand movement are the most critical abiotic factors for this ecological site concept, primarily in the context of geologic processes and coastline water and wind currents. The immediate forces of ocean waves as they meet the shoreline and inundate the surface have heavy impacts to the beach ecological site, depositing sediments and salt water daily and fluctuating the intensities and durations of the waves and tidal levels. This impact is a gradient from the immediate locations that are impacted by the waves, up to the portions where the wave waters end and recede.

The salt spray gradient is a function of wind speed, distance from the tide line, height above the ground, and microtopography. Hypertrophy (succulence) accounts for the ability of dicots to withstand salt spray, and grasses that lack this ability, rely on a thick cuticle instead. Salt spray tolerance dictates the species composition that dominates the different areas of this ecological site, but also impacts the structure of the vegetation expression as well. Although beach species are not obligate halophytes, they are tolerant of soil salinity and occasional seawater immersion. Germination and establishment phases of most beach species is when they are the most vulnerable to the soil salinity, and therefore depend on times that seawater immersion and impacts from salt water are minimal until after full establishment.

Primary Disturbances

Wave action from the ocean is the primary disturbance, however wind will also plays an important role. The constant impact from the ocean waves maintains a dynamic of barren sands and sparse vegetation cover that is able to withstand a rather constant daily fluctuations in inundation by salt water and high velocity wave actions. Water deposition, onshore winds, desiccation, nutrient limitations, and sand burial are all important disturbances that naturally drive the dynamics of this ecological site concept. Adaptations to sand burial are key adaptations for vegetation in this ecological site, developing larger, heavier seeds that have the ability to emerge from much greater depths once germinated. These species have also adapted to planting themselves deeper in the sands to take advantage of higher soil moisture content and protection from the wind/sea salt spray. Other adaptations include plant morphologies and canopy densities. Different accumulations of sands occur with different plant canopies, for example plants with intermediate canopy densities with loose, cylindrical silhouettes cause a decrease in wind velocities within the plant canopy leading to accretion of fine sands and the formation of hummocks typical of this ecological site.

Desiccation is a major stressor to this ecological site, namely from intense solar radiation and evapotranspiration, seasonal drought, and low water-holding capacities of the sands typical of this ecological site. The species that dominate this ecological site are adapted to these conditions, using various rooting strategies, leaf morphologies that can withstand high levels of solar radiation, high light intensities for photosynthesis, and wind desiccation, and root and shoot strategies to ameliorate the low-fertility soil conditions.

Dune morphology begins when beaches with vegetation create shadow dunes or beach mounds. These shadow dunes occur when a plant causes wind to be deflected, slowing its speed and dropping sand particles into an elongated tongue of sand in the lee of obstacles. Changes in wind direction result in accumulations on all sides and the formation of a beach mound. These can be easily blown out by wind gusts or winter waves. However, when they are built on relatively wide areas of beach, a foredune can develop. A foredune is a vegetated ridge of sand parallel to the beach, rising above the ordinary high tides. These foredunes support greater species richness and plant cover than the upper beach, but fewer species that are found just inland on dune ridges.

This ecological site concept includes these more incipient shadow dunes and the foredunes that are vegetated and stabilized. Since these shadow dunes and foredunes are both easily impacted by winter storm waves and heavy coastline winds, they are considered more a portion of this ecological site instead of the stabilized dune ecological site that has more distinct, stabilized vegetative cover and higher species diversity.

Major Land Resource Area

MLRA 004B
Coastal Redwood Belt

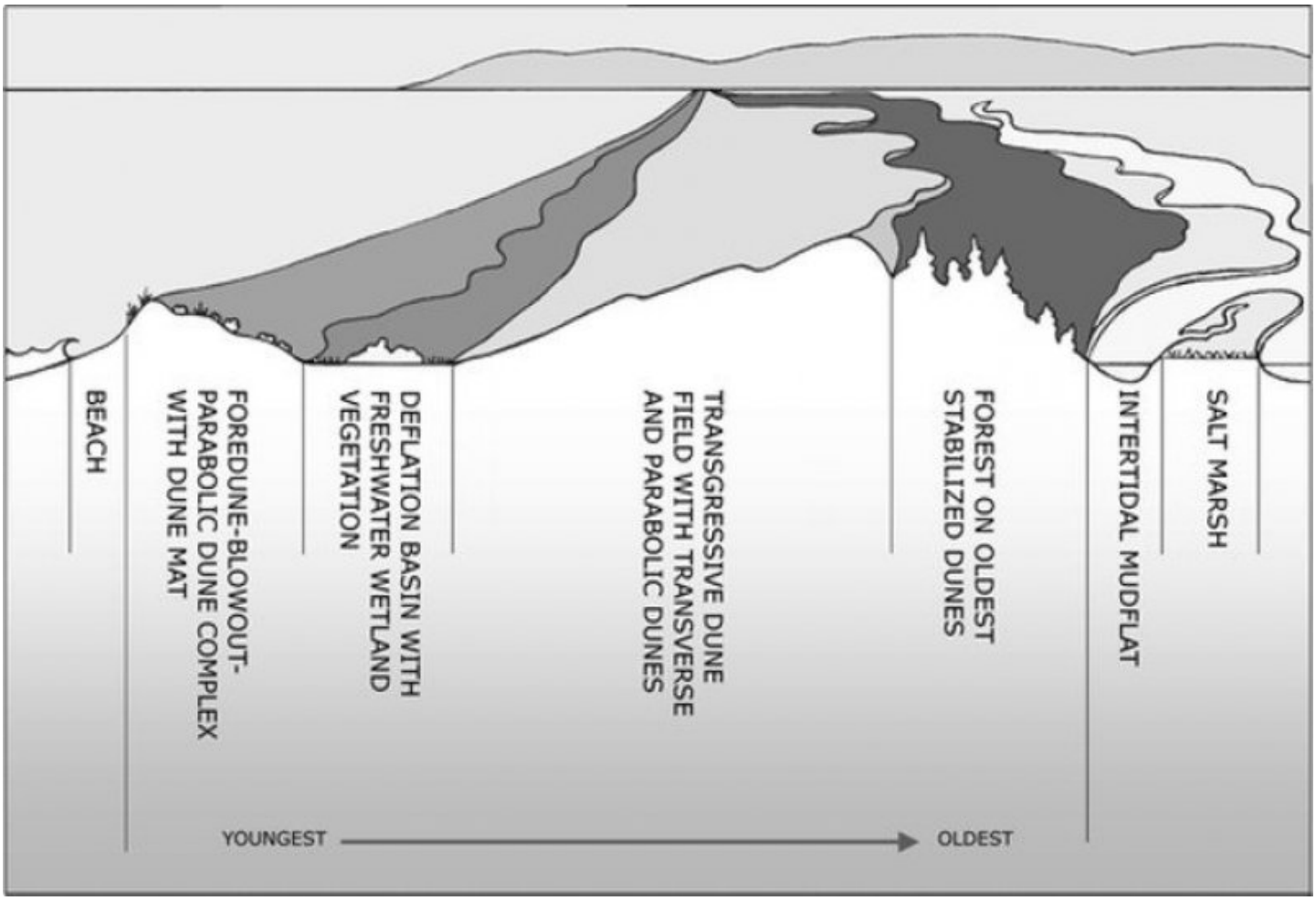
Stage

Provisional

Contributors

Kendra Moseley

State and transition model



State 1
Reference State

The dynamics described below are general to the level that the site concept has been developed for Provisional ES 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) – The beaches of the Northern Coast in general are more floristically diverse than the beaches of the Southern Coast, starting south of Point Conception. However, the reference state of this site is essentially only dominated by a limited genera of species adapted to the heavy wave action, constant daily, fluctuations of inundation from variations in the tide levels, and high amounts of salt in the source water. There are no known dynamics currently that push this ecological site out of this reference condition that could be identified at this time. 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.

Dominant plant species

- American dunegrass (*Leymus mollis*), grass
- beach strawberry (*Fragaria chiloensis*), other herbaceous

Community 1.1

This community is generally a complex of open beaches and scattered vegetation cover. Species that are most dominant include *Leymus mollis* (American dunegrass), *Ambrosia chamissonis* (silver bur ragweed), and Cakile spp. (searocket). There may be locally distinct and endemic species only found in certain areas of this beach community, but they are not recognized at this scale of provisional ecological site concept development.

Community 1.2
Reference Community Phase

This community phase represents the more stabilized parts of the beach that compose of the complex of shadow dunes that build and become reasonably more stabilized foredunes. These foredune communities are more diverse in species composition and varied in the forbs that are found intermixed with the dominant species on the foredunes, *Leymus mollis*. *Leymus mollis* is a psammophyte that thrives only under the conditions of active sand accretion.

Pathway 1.1a
Community 1.1 to 1.2

As active sand accretion occurs in the foredune portions of the beach strands, a more stabilized community develops.

Pathway 1.2a
Community 1.2 to 1.1

When foredunes retreat due to typical water and wind action, commonly in winter storms, this foredune community blows out and becomes open beaches again.

Citations

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