

Background Research About Dunes and Coastal Dune Scrub

What is Coastal Dune Scrub?

Coastal Dune Scrub is a plant community dominated by coastal herbs and shrubs growing on stabilized dunes. The salt and wind from the ocean influences this coastal community. It is both fragile and diverse due to a unique combination of disturbances and stability. Harsh and changing conditions give many species an opportunity to try to survive here. This great diversity in plant species allows for a complex web of interactions between them and the wildlife they support. To better understand these connections, dune scrub can be divided into layers.

Underground there is an amazing variety of insects, fungi, and bacteria. Although, one might see a very small plant on the surface, underground roots are many times larger; and it's the root systems that hold the dunes in place. There are two types of roots. (Annie: both roots access the same things, just in different places. They both access water/nutrients.) Long **tap roots** search for stores of water deep underground while huge **fibrous root** systems capture any surface nutrients that become available. Beneficial fungi and bacteria improve the uptake of important nutrients in the plants' roots in a **symbiotic relationship**. For example, some bacteria living along the moist roots can take the nitrogen in the air and store it in the ground where plants can get to this vital **element**.

On the ground, we find **leaf litter** and **soil crust**. The first layer is the soil crust. There are open spaces of exposed sand that may look barren. It is here that an invisible community of fungi and beneficial bacteria work with a thin layer of mosses and lichen. Together, they form a net to hold sand particles on the surface and help provide nutrients. Soil crust is an extraordinary, fragile and vital feature of the coastal dune scrub. It is a crunchy layer of life and sand on the delicate surface of the ground. When plant leaves die and fall to the ground (leaf litter), they begin to decompose. Usually, the decaying of leaf litter recycles the nutrients in the leaves and keeps soil rich and moist. The problem in dune scrub is that the plants generally have small leaves and tiny leaves easily blow away. So, there's not much leaf litter available and the soil is poor. Another important feature at ground level is the open spaces of bare ground, which are breaks in plant cover. This allows wildlife room to walk, slither, crawl, sunbathe, and burrow. These spaces are a special feature of Coastal Dune Scrub. Animal tracks, burrows, and scat are easily spotted here.

The **herbaceous** (soft stemmed) layer is the first layer of plant life, composed of **annuals and perennials** that are short (1'-3'). They grow low to the ground in flattened, creeping mats. This helps them survive in windy conditions without breaking their flexible stems. They have tiny, fuzzy or waxy leaves on their spreading stems that reflect light and trap moisture. The salt spray and fog are an important source of nutrients and water. As fog blows by, droplets get stuck on hairy leaves and drop toward thirsty roots.

Above the herb layer is the layer of subshrubs. This layer has a height of 1-3 feet and is dominated by perennials such as the California Aster (*Lessingia filaginifolia*) and Deerweed. Some plants here have soft stems near their crowns but get more woody near the base. The stems can be low or upright with many slender leaves. Subshrubs can be dense or have a lot of open space within their branches. These open branches provide cover and are important habitat for some wildlife, such as legless lizards and kangaroo rats.

The tallest layer is the woody shrub layer. Low-growing (3'-6') perennial shrubs dominate and give the (usually*) treeless community its name. Shrubs have several main trunks sprouting from a deep-rooted base. Woody branches are covered with many small leaves. Small leaves are well adapted for this environment. Their small, waxy or hairy leaves reflect the sunlight, retain moisture, and are responsible for the silvery-gray color the dune scrub appears to have overall. Although, Spring and summer are an exceptionally beautiful time with lots of bright wildflowers and many of the shrubs and subshrubs are blooming... such as wallflower, blochman's groundsel, silver lupine, giant wool star. Late summer/early fall is the best time to see the bright yellow flowers of mock heather, the reddish flowers of coastal buckwheat, the dark red/brown berries of coffeeberry...

- There is usually no tree layer or canopy in Coastal Dune Scrub. However, plant communities often overlap (**intergrade**). If an oak woodland area is nearby, it is likely to find an oak growing within coastal dune scrub. The Elfin Forest is an unusual oak woodland with its Pygmy Oak Trees that intergrades with coastal dune scrub as well as chaparral plant communities.
- Another interesting part of coastal dune scrub is that there are some plants that always are growing in association with others... you would not find them all by themselves. Examples include the sub-shrub wallflower (*Erysimum* ssp.), succulent lance-leaved dudleya (*Dudleya lanceolata*), and herbaceous indian pink (*Silene lanciniata*)... all of these

grow from under shrubs. They make little spots of color of their own, emerging from underneath the larger shrub story.

Coastal Dune Scrub Wildlife

The most obvious forms of wildlife are probably birds. On windy days, it's likely to see gliders such as Turkey Vultures, Red-Tail Hawks, and Red-Shouldered Hawks, though others are present. Other raptors that make appearances in coastal dune scrub are the endangered Peregrine Falcon and the petite American Kestrel. Of the smaller birds, White-Crowned Sparrows, Mocking Birds, and Scrub Jays are more commonly sighted. A chattering flock of Bush Tits and Wren Tits sometimes flutter through an area as well as Blue-gray Knat Catchers. If you hear something pushing leaf litter around, it might be a California Thrasher.

Other inhabitants include rabbits, snakes, legless lizards, lizards, lots of insects, and several rare, unique, or endangered species. The endangered Shoulder-Band Snail, with its distinctive stripe on one side of its shell, prefers to snuggle under the leaf litter of Mock Heather for habitat. The Morro Blue Butterfly is a locally unique and rare species that is dependent upon Silver Dune Lupine for food as an adult and a caterpillar and is crucial for its reproduction.

Rodents, such as Pocket mice, voles, gophers, and the endangered Morro Bay Kangaroo Rat are found in the Coastal Dune Scrub. Although they are shy and skittish, they leave tell-tale signs of their presence, such as sand mounds outside of burrows, seed caches, and sand pits for dust baths. Kangaroo Rats have large hind feet and drag their tails in the sand as they hop. Look for their strange tracks in the open spaces they inhabit. Coyotes and bobcats also may leave tracks behind but are generally shy.

Dangers and Problems

The Coastal Dunes are threatened by off-road vehicles, invasive exotic plants, and building development. The exotic (non-native) plant species that invade and dominate the dune scrub are African Veldt Grass (*Ehrhata calycina*) and Iceplant (*Carpobrotus edulis*). Slender-leaved iceplant (*Conicosia pugioniformis*) also has a presence.... Its fruits are appealing to ground squirrels, and it spreads easily this way. These two plants effectively compete with native plants for resources and win. Veldt grass has been shown to steal nutrients out of other plants and fills in any open spaces and disturbed areas quickly. Iceplants climb over other plants and kills them. It spreads quickly and roots at the nodes along its long, searching stems.

Climate, soil, and other factors influence which plants will survive. Some wildlife species use several plants and others need only one or two plant species. For example, the Morro Blue Butterfly's whole life cycle is linked to the Silver Dune Lupine, and the Shoulder-Band Snail needs Mock Heather. Rodents depend on seeds from several plants to feed them. Even the open spaces are required for survival by some wildlife. For example, legless lizards are found in the shade of open, woody branches of shrubs and the Morro Bay Kangaroo Rat needs open space in the dunes to hop away unhindered by dense vegetation. Some birds forage on the ground, others chase insects in the air, nest in the shrubs or soar in the sky. All parts are connected and exist together in the Coastal Dune Scrub ecosystem.