

## Sand Dune Zones - Gold Coast -

**September 2008**

The dynamic coastal environment is constantly exposed to abrasive winds, tidal and storm events and salt-laden air. Plant communities are specially adapted to these conditions, and fruits and seeds of many coastal plants are dispersed by ocean currents. Wind borne nutrients from the sea are deposited on coastal plants and washed into the sand during rainfall. Our dunal vegetation provides a protective buffer and the key to the management of our dune systems remains in identifying, utilising and preserving these unique plants.

All plants play a vital role in the formation and stability of our coastal dunes with zones of plants being a feature on healthy dune systems. The vegetation zone adjacent to the water is the strandline, or frontal dune with the mid dune next and hind dune furthest from the sea.

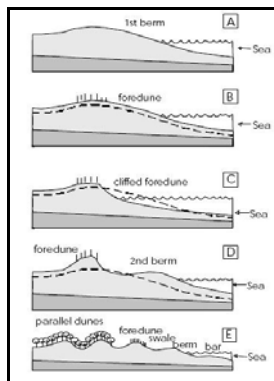


Diagram: The dune succession process (Source: Beach Protection Authority Qld)

### Zonation of Urban Sand Dunes

Dunes are formed through a build up of sand deposited through wave swash, the formation of micro ridges of sand and wind blown sand. Plant fretting, that occurs after dune erosion, assists in stabilising the remaining dune and allowing further deposition of wind blown sand. Dune systems run in a distinct profile with three different yet successive groups – primary, secondary and tertiary vegetation zones. Vegetation plays an important role in determining the size, shape and stability of the dune.

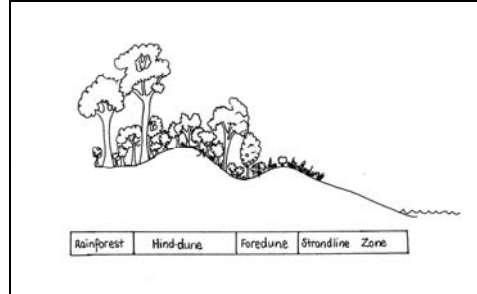


Diagram: Dune zonation (Source: Jodie Clifford)

### Fore Dunes (Primary)

Foredunes are immediately behind the sandy beach. They are formed from deposition or the accretion process of waves and wind blown sand.

Foredunes act as barriers against the action of waves and tides and they are a source of sand for the beach during storm erosion events. Vegetated foredunes are flexible, if they are damaged by storms, the remaining vegetation traps sand blown from the beach and the dune is reformed, thus providing protection against future wave attack. With no vegetation on the dunes, the sand would be blown away leaving no protective buffer zone from storm waves. Without vegetation there would also be little or no sand dune recovery after a storm event.

The roles of the plants, such as spinifex grass, in the primary zone are to trap wind blown sand and to stabilise the sand dune. In addition to stabilisation, these plants assist in improving the composition of the sand for the colonisation of secondary dune plants. For example the old leaves fall off the plant and form a mulch to help reduce the temperature of the sand, retain moisture and to add nutrients into the sand. This creates a friendlier environment for the establishment of the secondary dune system.

Typical primary plants you would find in the frontal dune include spinifex grass (*Spinifex sericeus*), pigface (*carpobrotus glaucescens*), beach bean (*Canavalia rosea*) and goat's foot (*Ipomoea pes-caprae*).

These plants are generally formed of long runners that spread out across the dunes covering a large area thus reducing wind blown sand. Each node (point where set of leaves attach) usually has a root system attached that firmly holds the plant in place. These plants can generally handle being smothered by sand (particularly spinifex) by growing upright and quickly through the sand. Primary plant species can tolerate low nutrients, limited fresh water and high temperatures. They are however, relatively fragile to trampling.



Photo: Spinifex grass on the foredunes at Palm Beach (Source: GCCM)

#### Mid Dunes (Secondary)

Secondary dune vegetation, such as coastal wattle (*Acacia sophorae*) and guinea flower (*Hibbertia scandens*), is next in line helping to colonise the mid dune area. Vegetation in the mid dune area is more protected from the wind, sand and salt spray. Additional nutrients and moisture is available for healthy plant growth.

Several also have the ability to fix atmospheric nitrogen which provides a friendlier environment for the further establishment of the hind dunes.

Plants species found in the mid dunes are generally smaller than their forest counterpart, as conditions are still harsher than a forest environment. As plant growing conditions are not as harsh as the primary zone, vegetation is generally slow growing and has a longer life span.

#### Hind Dunes (Tertiary)

Last but not least, the hind dune is located furthest away from the sea and consists of larger more established trees such as coastal she-oak (*Casuarina equisetifolia*), cottonwood (*Hibiscus tiliaceus*) and banksia (*Banksia integrifolia*). These plants have a longer life span and short seed viability. Vegetation here can remain dormant until light opportunity appears in the canopy.

Vegetation in the hind dune ranges from forest to littoral rainforest to heath. The area is usually densely vegetated and well protected from the usual harsh environment of the beach with more moisture retention capacity and improved nutrients. Therefore, there is a more diverse community of plants found here. If exposed during severe wave or storm attack due to erosion, vegetation here would be prone to die back.

Many species found within this zone were used traditionally by Aboriginal people. For example, scribbly gum (*Eucalyptus racemosa*) was used to treat diarrhoea, and the cottonwood (*Hibiscus tiliaceus*) was used as an antiseptic and the bark was used to make nets and rope.



Photo: Secondary dunes at The Spit (Source: GCCM)

Unfortunately, due to current coastal development pressures, the hind dune is not always present.

#### **Want more information?**

For more information sheets relating to sand dunes and coastal vegetation, see our website [www.griffith.edu.au/coastal-management](http://www.griffith.edu.au/coastal-management).

#### **Want to help our beaches?**

*BeachCare* is a community based program assisting in establishing groups to undertake activities caring for the Gold Coast beaches and foreshores. Activities may involve dune planting, weeding, seed collection and propagation.

If you would like to join a *BeachCare* group or organise a school *BeachCare* planting day please contact the *BeachCare* officer on (07) 5552 8506 for more information.