

# Management guidelines for dune use

## Re-establishment of dunes: methods of construction

### Introduction

Severely damaged dunes may require re-establishment to provide a stable and effective coastal barrier. A basic approach to the principles of dune re-establishment is given in Leaflet No.V-03.2, and aspects of sand dune design are described in Leaflet No.V-03.3. Following a decision on dune design reached using the criteria outlined in Leaflet No.V-03.3, the dune can be constructed using one or more of the four methods described in this leaflet.

In most cases, the sand used in dune construction should be obtained from source areas remote from the active sand system of the dune under construction and where the removal of sand will have no harmful effect on other beaches.

### 1. Importing sand

If there is no local supply of sand, the dune can be constructed using sand trucked from another source. The imported sand should have a median grain size similar to that of the natural dune to allow normal establishment and growth of vegetation. Sand of



The early stages of re-establishing a beach and dune system with sand dredged from a nearby estuary.

coarse grain size usually has poor nutrient- and moisture-holding capacity which can severely retard plant growth, while too fine a grain size allows the sand to be easily removed by wave action and is susceptible to wind erosion. The imported sand is placed at the appropriate dune location and earthmoving equipment is used to construct a dune of the required size and shape.

This method can be used where rapid repair of the dune line is needed as a result of localised damage caused by overwash or by wind or wave erosion.

### 2. Using sand from the beach or hind-dune areas

Earthmoving equipment is used to push sand up from the beach or hind-dune areas and then to construct a dune of the required size and shape at the correct location. If beach sand has been used for dune construction, stabilising dune vegetation should be planted as soon as sand salinity levels drop sufficiently to allow establishment of sand spinifex grass. Sand samples can be analysed for salinity using a conductivity meter, by arrangement with a representative from a local fertiliser company or by government agencies.

### 3. Hydraulic placement of dredged sand

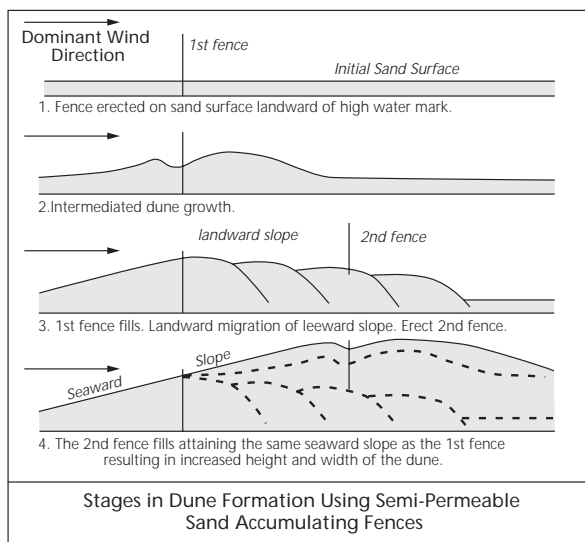
This method of dune construction moves sand to the chosen location by pumping it from offshore or appropriate estuarine dredging sites. Dunes of the required size and shape can then be constructed using earthmoving equipment. This is a quick but

expensive method of re-establishing a dune line, and it is used when rapid repair is needed owing to severe erosion problems or where a large volume of sand is required. The sand used should have a median grain size similar to that of the natural dune and be free of mud and silt so that the re-established dune will be free draining. Time should be allowed for the salinity levels to drop (see method 2) before starting revegetation, and if the dredged material contains a lot of shell, the pH may be elevated which can affect the availability of some mineral nutrients needed for plant growth.

#### 4. Sand accumulators

Sand accumulators used for gradually rebuilding dunes from windblown sand are generally of three types.

(i) In situations where there is a good supply of windblown sand and it is not imperative to form a large dune very quickly, sand can be accumulated cheaply and effectively by planting and stimulating the growth of the natural dune-forming native vegetation. This method is risky in situations where the foreshore is low and subject to inundation from large waves. Such sites need sand placement or accumulation to build up the levels and make them suitable for the establishment of vegetation.



The main sand-accumulating pioneer species along the Queensland coastline is sand spinifex grass (see Leaflet No. IV-01) which is well adapted to trap and stabilise windblown sand. This grass can be established from seed or cuttings and using brush matting or a cover crop to provide initial surface stabilisation. The grass will grow up through the sand as it traps it and thus support the dune-building process. Heavy applications of nitrogenous fertiliser can stimulate very rapid growth of sand spinifex grass into bare areas so that the sand trapping/dune-building process can proceed. Further information on the establishment of sand spinifex grass can be found in Leaflet No.V-04.1

(ii) Vertical structures such as semi-permeable fences accumulate sand in a narrow band adjacent to the structure. Windblown sand is trapped on both the windward and leeward sides of the structure to form the new dune. These structures can be used to repair gaps in the foredune, to initiate rebuilding of an eroded dune line, or to protect planted areas from windblown sand until vegetation is established. For further information on these types of sand accumulators refer to Leaflet No.V-03.5.

(iii) Surface "rougheners" such as brush matting accumulate windblown sand over a wider area but to a shallower depth. Pieces of brush laid flat on the sand's surface reduce wind velocity and trap windblown sand. As the layer of brush becomes buried, more brush is added, and so on, until a dune of the required size and shape is formed. Brush matting is also a useful surface stabiliser while dune vegetation is being established. Further information on brush matting is given in Leaflet No. V-03.6.