

The formation and function of coastal dunes

Formation of blowouts, parabolic dunes, low dunes and mobile sandsheets

Blowouts

Blowouts form when strong onshore winds erode a gap in a single foredune or series of beach ridges. The wind blows through the gap, sweeping sand from the beach and dune (or beach ridge) in an inland direction.

Where foredunes or beach ridges have been cut back by wave action, leaving an unvegetated cliff of loose sand, strong onshore winds can initiate blowout formation. Blowouts also develop in the foredune/beach ridge system where the stabilising vegetative cover has been damaged or destroyed by

natural causes (drought, fire or cyclones) or by human interference (grazing, clearing, heavy pedestrian and vehicular traffic).

Unless the gaps in the foredune/beach ridge system are repaired by sand accumulations colonised by stabilising vegetation, the blowouts increase in size and migrate inland under the influence of the prevailing winds. Series of consecutive blowouts developed in an unstable foredune/beach ridge system often grade into parabolic dunes (see diagram).



Parabolic dune formed in the foredune system with a massive dune blowout in the hind dune area to the south of Stockyard Point, near Yeppoon.



Parabolic dunes

Blowouts migrating inland under the influence of the prevailing winds have an advancing nose of loose sand and trailing arms of sand which have been partially fixed and stabilised by vegetation. In this way, the blowout develops into a parabolic or U-shaped dune (see diagram). Dunes of this type often disrupt a system of parallel dunes or beach ridges.

The dunes retain a parabolic form as long as they remain partly vegetated so that the trailing arms are held back by vegetation. When the stabilising vegetation is removed, the parabolic form is lost and wind action produces large transgressive sand dunes.

Transgressive dunes are dunes that have been driven in the direction of the prevailing wind over any surface except mobile sand. Large transgressive dunes with ridges aligned across the prevailing wind occur on North Stradbroke Island. Several sets of transgressive dune ridges are arranged roughly parallel to the ocean coast. Each ridge partly overlaps its predecessor and is stabilised beneath a cover of scrub and forest. The ridges range up to 30-60m above sea level and consist of silica sand blown from the beach in relatively recent geological time when sand supply was greater than at present.



Unstable foredunes, blowouts and high vegetated parabolic dunes to the north of Stockyard Point.

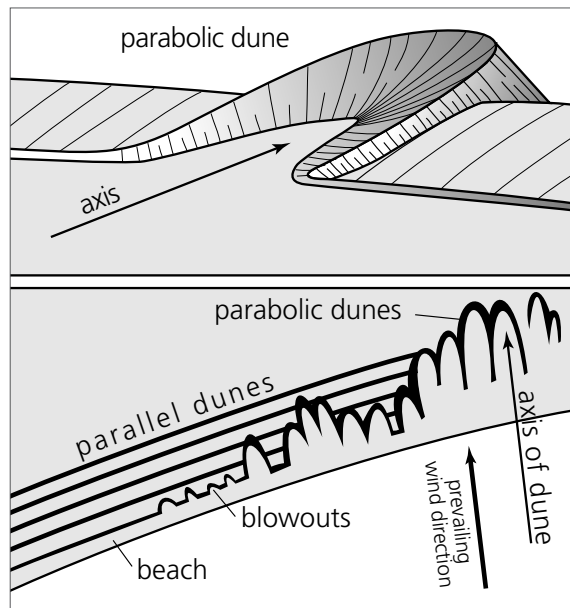
Low dunes and mobile sandsheets

Low dunes and mobile sandsheets are generally less than 30m above sea level and partially aligned to the prevailing onshore winds. They are features of parts of the east coasts of Fraser, Moreton and North Stradbroke Islands. Wind reworking the foredune and/or narrow beach ridges causes the landward migration of mobile sandsheets.

Formation of low dunes and mobile sandsheets is initiated where the stabilising cover of vegetation on foredunes and beach ridges is damaged or destroyed by overgrazing, drought, fire or cyclones. They are highly unstable, with many active blowouts. Vegetation cover is sparse and insufficient to trap and hold sand blown from the beach. The sandsheets consist of well-sorted silica sand of uniform grain size and showing little evidence of soil development.

Acknowledgment:

Bird, E.C.F. (1972) Coasts: An introduction to systematic geomorphology, vol 4, p.139. Australian National University Press, Canberra.



Above, diagram of a parabolic dune. Below, blowouts and parabolic dunes interrupting parallel dunes on a coast (adapted from Bird, 1972).