

Restoring Back Dune Ecosystems

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At the Piha Dune Restoration Trust annual conference I outlined the progress of the last 15 years of fore dune and back dune restoration work at Te Henga/Bethells Beach, and the planning and lessons we have learnt along the way. Now that many community groups are carrying out similar projects (or planning to), I thought they might learn from our successes and failures – rather than repeating them!

Bethells Beach is on Auckland's west coast in the northern Waitakere Ranges. The community started actively managing their dunes in the 1960s and 70's with marram grass planting, but they couldn't sustain their efforts and the 40ha of dunes in front of this west coast beach settlement continued moving inland. By 1992 large dunes threatened to engulf the surf club, public toilets and parking areas. It was typical of the human impacts on New Zealand sand dunes ecosystems described recently (Spence, Bergin, & Dean 2007) and included:

- Removal of lowland forests from back dune areas.
- Wind erosion associated with degradation and damage of indigenous foredune vegetation.
- Loss of indigenous dune vegetation to exotics

Alison Davis and myself proposed that the community and Waitakere City Council should attempt to restore natural vegetation on these dunes, with a community-council partnership to manage and implement the project. Both parties agreed and a revegetation plan was developed, that was strongly driven by the local community.

The first problem we encountered was that many people didn't understand that dunes were normally vegetated and the back dunes in the Auckland Region were forested. This wasn't helped by the almost total annihilation of dune forests in the region (and most of New Zealand). We needed to find some reference areas to reconstruct our local dune vegetation ecosystems, and the closest areas were in the north and south Kaipara dunelands to the north. On examination, we found these dune forests were quite similar to the Aupouri dune forests in the Far North and between these two major dune systems there were a number of forest and shrubland sites with natural vegetation on dry ridges, damp gulleys, dune slopes, with varying distances from the coast and on both recent and old(leached) dune soils. Each of these different situations has subtle differences in vegetation composition. We had enough information to convince most of the sceptics!

The dune hollows typically had kohekohe, karaka, kahikatea and puriri forest, while the dune ridges had totara, tanekaha, matai and maire, with kanuka scattered through the light gaps. The seaward forests had more pohutukawa and kanuka, and coastal shrubs like houpara and karo.

To get the project moving we concentrated on rebuilding the foredune with pingao planting among dune fences, to trap the beach sand that was moving into the dune system. At that time, the only dune plants we could get were pingao and marram! By the third year of planting the fences were completely buried and the vegetation has built the dune 6 – 8 metres higher than when we started. We also started planting spinifex shoots, as nobody was growing it then. Although there was only a 10% success rate the surviving plants completely cover the foredune and much of the pingao and its progeny is drying out, as the dune has stabilised.

That gave our group the courage to tackle the bare moving sand in the back dunes. We planted pingao, flax tauhinu and even marram! We tried all sorts of configurations to minimise wind and sand movement, but a lot of it failed. What we didn't see was that we still had thousands of tonnes of sand still moving through the area, as the marram-covered dunes collapsed and new sand was mobilised. Eventually Chris Ferkins from Waitakere City and I developed a sand fencing system based on a series of tall baffles to prevent plants from being blown away in the 3-4ha of bare sand we had left. Most of our back dunes are now stabilised and are being planted in dune trees and shrubs, or they are naturally regenerating where there is sufficient groundcover.

By 2002 we had made some progress in slowing sand through planting, but our greatest progress came from a combination of total rabbit control and fertilising. This meant we didn't have to plant many areas as they were naturally regenerating. Our large marram dunes continued failing and blowing away but we were finally getting (vegetated) closure on the open back dunes, 10 years after we started!

In the meantime, one of our members, Dave Norton started raising trees and shrubs and planting in the scrubby stabilised dunes and dune hollows to the south of the active dune area. By the time most people had looked over the dunes at the end of the pingao and spinifex planting, Dave's eight years of toil was starting to become a forest. The dune hollow plantings have been particularly successful, as they survive the driest summers and quickly modify the wind flow through the dunes – making it easier to establish plants later on dune slopes and ridges. He planted about 10ha of dune forests that is now starting to reach canopy closure. Although Dave died in October 2008, his legacy lives on, with regular plantings by those inspired by his work. Now locals and visitors alike can see that our dunes were forested and they can be restored!

The key is long term planning; Get the detectives out and find some (semi) original dune vegetation so you can reconstruct your dune landscape and ecosystems. But you will need to stabilise the dunes, then plant the easier sites (gullies) first and you may need a couple of decades to get there.

We have learnt that it is always difficult working on the backdunes, there is lots of failures with fences and planting and lots of sand moving. Our next stage is preparing a new restoration plan for the next 10 years and recording our progress over the last 10 years. We will be focusing on maintaining the tree and shrub planting with second stage species, recovering threatened species including some of the dune animals (katipo,

reptiles, dotterels). We started with a 50 year vision, its only 18 years later and we are still have another 32 years to get there!

