

**Notes on site visit to Mangawhai Spit between DOC and Mangawhai Harbour Restoration Society:  
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**Introduction**

Nigel Miller (DOC, Whangarei) was approached by the Mangawhai Harbour Restoration Society (MHRS) about the planned broadcast of fertiliser (urea) by helicopter on Mangawahi Spit. Nigel sought advice from me, and I got David Bergin (Dune Restoration Trust of NZ) involved in the field trip, because of his experience with dunes and because it coincided with a visit by him to Northland.

Prior to the joint field trip Nigel had sought urgent advice on the idea of spreading urea, because MHRS had a helicopter lined up and were eager to proceed. After consulting David Bergin and others I advised Nigel Miller not to proceed with the broadcast of the fertiliser in July as plants are unlikely to be growing mid-winter, and it wouldn't remain available for plants for the few months until they could gain benefit from it in spring. Fertilising could potentially raise the nutrient levels of the lake without any benefit to native sand binders on the dunes.

Nevertheless, MWRC and Nigel Miller wanted some guidance on the future application of urea, and on the management of the spit, hence this site inspection.

**Present:**

Mangawhai Harbour Restoration Society: Graeme Smith and Jerry Pilmer. Trevor Downey (President, MHRS) was present for a discussion about the site before we went to the spit, but didn't join us for the field visit.

DOC: Nigel Miller (Biodiversity Ranger, Whangarei) and Graeme La Cock (Technical Advisor Ecology, Wellington)

Dunes Restoration Trust of New Zealand: David Bergin (at request of GLC)

**Background to reasons for wanting to maintain vegetation on Mangawhai Spit**

The Mangawhai Harbour Restoration Society gives a very good overview of the reasons for wanting to maintain the Mangawhai Spit in its current position, as well as a timeline of breaches of the spit and management actions undertaken. Their website also contains a detailed description of the site, its history and current management (<http://www.mangawhaiharbourrestoration.co.nz/>).

Breaches of spits like that at Mangawhai do naturally migrate up and down the coast over a period of several years. In this instance the entrance is being artificially maintained at the northern end of

the spit in order to maintain a safe lagoon and harbour behind it, and to provide safe passage to the sea. These initiatives dictate the scope and extent of management activities that can be undertaken, and set the parameters for any future work. As a result of these maintenance initiatives an ephemeral dune lake system has established towards the northern end of the spit (Photo 1).



**Photo 1. Ephemeral lake, looking back towards Mangawhai. Note pingao and low *Carex pumila* dune.**

The New Zealand fairy tern (*Sternula nereis davisae*) has a history of breeding on Mangawhai Spit and continues to breed there. This species has a threat status of Threatened – Nationally Critical (Robertson et al 2013).

### **The site visit**

We met at the main boat ramp at Mangawhai Heads at 12.30, and Graeme Smith took us across to the Spit in the MHRS boat. We landed in the MHRS near the northern end of the lake, and undertook a visit of the dunes from the landward site around the northern end of the lake to the dunes on the seaward side of the spit.

### Dead pingao

There was a large area of dead pingao north of the lake (Photo 2 and 3). The main cause of death appeared to be lack of fresh sand being blown into the pingao. Pingao and spinifex need fresh sand to survive, and eventually die off if this supply of sand is cut off. Parts of this very exposed dune spit are likely to undergo periods of sand accumulation with vigorous growth of sand binders followed by periods when sand supply is reduced as vegetation cover reduces or stops sand movement. Over time areas of dead sand binders will become active sand dunes causing localised deflation but with the movement of sand providing ideal sites for reestablishment of sand binders.



**Photo 2: Dead pingao across substantial areas of dunes likely as a result of reduced sand supply, with pockets of healthy and thriving pingao where fresh dry sand is accumulating fed by onshore winds.**



**Photo 3. Dead pingao. The most vigorous spinifex and pingao appear to be thriving where fresh sand is deposited.**

Pingao was clearly thriving at a localised scale where fresh wind-blown sand was being deposited, as a result of prevailing onshore winds (photo 4 and 5). The role that vegetation plays in facilitating accumulation of sand is clearly evident in these two photos, especially Photo 5. What is also evident from these photos is that a small clump of plants can make a difference; blanket planting isn't always necessary.



**Photo 4 and 5. Healthy pingao in freshly deposited wind-blown sand.**

### **Erosion of sand and loss of plants along sand fences**

The MHRS has constructed sand fences up to 4 m high in places, and so has trapped a lot of sand that would have blown across the spit from the sea to the lagoon. This may have contributed to the pingao dying, but it's only a suggestion. I'd be interested in any observations of dying pingao from before the fences were erected.

A lot of cost, effort and volunteer hours have gone into the erection of sand fences stretching for about 1.5 km seawards of the lake. As a result of these fences the dune has built up to a height of at least 4 m in some areas. Extensive planting was done along these fences. A lot of these plantings were lost in a storm in mid-July 2014, and the top half a metre of the fence was exposed again, having previously been completely covered up (photos 6 and 7).



**Photo 6. Top of sand fence exposed by heavy storms. Note lack of sandbinders following heavy storm erosion, but buildup of sand around surviving vegetation and other obstructions on the beach.**



**Photo 7. Seaward sand fence showing more exposure than fence located further inland. Note lack of vegetation despite early heavy planting of sand binders, but survival or re-establishment of dunes around patches of surviving spinifex and pingao.**

Despite these losses of vegetation, the value of surviving plants is clearly demonstrated in Photo 8, with sand beginning to accumulate downwind of a surviving clump of spinifex.

### **Future plantings**

MHRS has several thousand pingao and spinifex to plant out. Rather than plant over large expansive wind swept areas of dunes devoid of vegetation, a strategy to consider is planting around existing pockets of vegetation where this is some shelter afforded, such as those shown in Photos 4, 5, and 8, and more specifically in Photos 9 and 10. It is recommended that small groups of 5-20 seedlings per group are planted in and around the lee of existing clumps of spinifex and pingao to spread the risk of plant losses over a number of sites.



**Photo 8. Sand beginning to accumulate around surviving spinifex plants.**

The idea is to plant into areas that are actively been fed by sand (accumulation zone), such as the fresh sand to the right of the the pingao (lee of onshore prevailing wind) in Photos 9 and 10, rather than planting into areas that are losing sand (take off zones or deflation areas) and where there isn't a fresh supply of sand likely to accumulate. In photo 9 the pingao to the left of the photo isn't receiving fresh sand, as the area to the right is. This pingao will probably die off within a year to 18 months.

In several photos (1, 9, 10) *Carex pumila* is occupying the wetter substrate of swales near the ephemeral lake. There is no obvious competition from weeds at these sites where shallow dunes are forming. The low *Carex pumila* dune in Photo 1 demonstrates the effectiveness and potential of this species as another sand binder in wetter environments.

However, saltwater paspalum (Shaw & Allen 2003; Impacts of sea couch and saltwater paspalum in BOP estuaries. DOC Science Internal Series 113 - <http://www.doc.govt.nz/documents/science-and-technical/DSIS113.pdf> ) occurs along parts of the low lying flats immediately adjacent to to the ephemeral dune lake. Depeding on the extent of this species, consider options to contain and ultimately eliminate this species over a 3-5 year period around this dune lake.





Photos 9 and 10. Fresh sand accumulating in lee of pingao. Note the *Carex pumila* in the damper areas and starting to accumulate sand in both photos.

## **Rabbits**

There appeared to be only minimal recent damage to sand binders and occasional rushes around the periphery of the ephemeral lake. Nigel Miller has recently laid pindone poison to ensure rabbit numbers are kept low.

It is imperative that rabbit numbers are kept at low numbers, because they are capable of destroying new plantings in a very short time. Numerous plantings have failed around New Zealand, especially on the coast, because rabbits haven't been controlled. Current advice is that there is no point in planting if you haven't controlled the rabbits. Although we didn't see much sign of rabbits on this visit, that may be because of a recent successful operation by DOC, and if left alone they will build up to high numbers again and start to impact on plantings. I therefore recommend that an ongoing control programme is implemented to keep rabbits at low numbers, so that future plantings of sand binders may be successful.

## **Use of urea**

As can be seen from most photos there are vast areas of open sand. Fertiliser is ineffective in unvegetated areas. Further, it's unlikely to make a difference to the dead and dying pingao in the long term. I therefore consider the aerial broadcast of fertiliser to be unnecessary and probably wasteful of a resource. Hand broadcast of some fertiliser around clumps that have taken a hammering from a recent storm, such as in Photo 8, could be worth testing to boost growth. Methods for application of fast-release fertiliser to existing sand binders are provided in the Coastal Dune Vegetation Network's (CDVN) spinifex bulletin (Bergin 1999).

## **Options for planting other species**

It is suggested that there may be only limited scope for planting additional species at the northern end of spit as much of the area is windswept active dune dominated by sand binders. Even in areas where there is substantial pingao dieback, as discussed above these areas are likely to be too exposed for establishment of species found on mid and back dune zones and may in fact revert back to areas of sand accumulation where the pingao and spinifex will once again dominate.

If the group is keen to test some native sand dune species found in semi-stable zones, it is suggested that very sheltered low lying areas as landward as possible are selected and small groups of a limited number of species are planted and closely monitored for early performance. Hardy species to evaluate initially include knobby club rush, harakeke, tauhinu, ti kouka and taupata (the latter 2 species with good rabbit control). Establish plants at close spacing between seedlings (<1m apart) to maximise mutual shelter and plant in small single or mixed species groups of 3-5 seedlings per group.

**Long term management**

These comments provide some advice based on a short site visit to one part of the spit, and need to be used in this context.

However, I believe that Mangawhai Spit would benefit from a more extensive management plan that covers the entire spit, and that includes advice on plantings, sand fences, fertiliser use, rabbit control, and the habitat requirements of the fairy terns and dotterels.