



BEACHCARE Magazine

Edition 5, 2014
Celebrating
20 years of Beachcare

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Cover: Collage of Beachcare volunteers spanning 20 years.

KIA ORA KOUTOU!

Hi everyone!

This edition of the *Beachcare Magazine* marks a significant milestone for Beachcare – the 20 year anniversary of community-based dune restoration in the Waikato. The montage of photos on the cover spans all 20 years helping to celebrate this significant achievement.

Beachcare groups had their humble beginnings in the early 90s, when the first two community-based dune restoration groups in New Zealand were established at Whiritoa Beach and Port Waikato. Twenty years on, there are now Beachcare groups operating at 24 beaches across the Waikato region where committed volunteers plant over 50,000 native coastal plants a year!

This amazing amount of volunteer effort follows a worldwide trend of volunteers making a significant contribution towards solving environmental issues. Alongside this increase in volunteer effort has been an upsurge in ecological restoration research and the development of new technology and techniques that can assist restoration volunteers. To reflect these trends, our feature articles in this issue explore two of the key factors in any successful community-based dune restoration project: a sound ecological restoration process and a high level of community involvement.

One aspect of the restoration process involves the use of ecosystem models or 'reference sites' to help guide restoration decisions. In our beach profile section, we look at two 'reference sites' for dune restoration in the Waikato – Otama Beach and Oioroa (Aotea Scientific Reserve), which are the two highest ranked dune-land ecosystems in the region.

In recent years there has also been a trend towards 'citizen science' where volunteers can help monitor ecological change over time. In our 'Beachcare education' section we take a look at some guidelines for monitoring dunes, and some techniques that can be used by volunteers.

We also take a look back at what Beachcare volunteers have achieved on the ground during 2014 in our group updates, to share experiences and knowledge between the groups.

We hope this edition inspires your dune restoration projects and adds to your knowledge of ecological restoration.

"Never doubt that a small group of thoughtful committed citizens can change the world; indeed, it's the only thing that ever does." – Margaret Mead.

The Beachcare team

A natural stand of pīngao flourishing on the fore-dunes at Otama Beach, Coromandel. Otama Beach has one of the best dune systems in the Waikato region and is useful as a "reference site" (see page 16) for dune restoration at other Coromandel sites.



Beachcare groups: Coromandel Peninsula



Whangamata

The Whangamata Beachcare group is a community-based partnership in which volunteers work with Waikato Regional Council and Thames-Coromandel District Council (TCDC) to restore the coastal dunes along the Whangamata foreshore. In 2015, the group will celebrate 20 years of successful dune restoration in Whangamata.

In 2014, the Beachcare group was very active with volunteers involved in several planning meetings, site inspections and working bees focused on restoration around the Whangamata Surf Life Saving Club, Island View Reserve and the Esplanade. The group's publicity efforts and its liaison with landowners along the beachfront also helped promote increased understanding and support of the dune restoration work.

The first group working bee for 2014 was held in April. This continued ongoing restoration work in the high-use surf club area, which has really moved ahead over the last three years in co-operation with the surf club. Ongoing weed maintenance has also continued. This has been critical to the success of the restoration as the native plantings are surrounded by exotic perennial grasses, which would otherwise quickly invade the area. The work in this high-use area is now well advanced and achieving its goals.

The second working bee of the year saw the beginning of dune restoration on the dunes seaward of the popular Island View Reserve. The badly weed-infested area was cleared back to bare sand and then planted with native dune vegetation. The restoration work in this area will be continued in 2015.



1 The Whangamata esplanade just before the first dune plantings went into this part of the beach in 2000. Note the sand accumulation issues on top of the reserve strip due to the lack of dune vegetation.



2 Volunteers in action during the 2000 planting working bee.



3 Six years later, in 2006, the native dune plants in the esplanade area are thriving and are being well protected by a network of beach access ways.



4 The same area in 2015. Fifteen years after this area was first planted by Beachcare volunteers, and many storms later, the re-established dune buffer is able to self-repair following storms and continue to protect the car park and reduce the sand accumulation issues.

Below: Whangamata Area School students helping with the infill planting at the Esplanade in 2014.



The third working bee focused on the Esplanade area – the highest use beach area on the Coromandel. The badly damaged dunes in this area were originally restored by Beachcare in the early 2000s. This resulted in significant seaward growth of the dunes during the accretion cycle which was continuing at that time. In recent years, the area has been in a natural erosion cycle and the dune is slowly retreating back towards the car park. Further ongoing erosion is likely in coming

years due to the present climate cycle and so the planting has been aimed at restoring sand trapping vegetation right back to the grassed reserve. Once the present erosion cycle has ended, this vegetation will rapidly repair the eroded dune. The restoration planting in 2014 was undertaken by the local Whangamata Area School.

Overall in 2014, Whangamata Beachcare volunteers planted just under 6500 plants.

Whiritoa

Two site inspections were conducted during 2014 to review earlier restoration works immediately south of the surf club, together with spraying in autumn to remove exotics – but no new restoration works were undertaken.

The restored area is doing well but there is evidence of increasing erosion in central areas of the beach which is causing concern in the local community. Liaison with locals and Hauraki District Council is planned over summer with a view to developing an integrated plan for the area which may involve further dune restoration works in 2015. Weed control is also planned for autumn and spring to maintain existing restoration works.



The area restored in 2013 is looking good.



Erosion in the central areas of the beach is causing concern.

Onemana

Four site inspections and visits were conducted during the year and the group held three working bees – two planting and a third to fertilise sparse vegetation. The work focused on serious windblown sand issues at the northern end of beach associated with people damaging sand binding vegetation. The issues included significant sand inundation of a private property and grassed reserve which required extensive machine work to clear (paid for by a local landowner and Thames-Coromandel District Council (TCDC).

TCDC and local Beachcare members' combined efforts included forming of a defined pathway to better manage pedestrian access and constructing and planting to develop a new (incipient) dune to intercept windblown sand. A smaller incipient dune feature was constructed and planted as an experiment to try to reduce windblown sand issues at the seaward end of one of the major beach access ways. Weed control was also carried out in autumn to maintain previous restoration in central and southern areas and these earlier restoration works continue to thrive.

Work in 2015 is likely to continue to focus on the northern end of the beach.



A pathway has been defined and the borders planted with native dune plants by Beachcare volunteers.



The small dune constructed to intercept windblown sand that had been causing issues for properties neighbouring the beach.

Tapu - Thames Coast

Beachcare's involvement in restoration work on the Thames Coast with TCDC commenced in 2014, as part of the ongoing erosion and coastal management for this area. The coast has extensive sea walls but work is continuing with TCDC to identify opportunities for restoration of natural buffers. The site inspections and meetings culminated in a small planting at Tapu in 2014, with Tapu School involved and doing the planting. Continued discussions are planned for 2015 in the hope that work can be expanded at other sites along this coast.



Students from Tapu School helping to enhance the natural character of the Thames Coast through native plantings.

Tairua

Two site inspections were conducted during 2014, reviewing earlier restoration work: however, no further planting was carried out. In general the earlier plantings continue to do well but some have been significantly damaged in front of two properties due to poorly managed vehicle and pedestrian use.

There have been initial discussions with landowners and TCDC staff and further discussions are planned over summer to agree appropriate action. If appropriate agreements can be reached with the adjacent landowners the damaged areas will be restored in autumn 2015. Weed spraying was conducted in autumn 2015 to maintain the restored area with garden plants (especially gazanias) from an adjacent property presenting an ongoing problem.

Top right: Past restoration plantings are doing well in most areas.



Right: Some of the plantings from previous years are beginning to be infested with “garden escapee” exotic plants such as gazanias which are becoming a real threat to dunes in the Waikato region.

Pauanui

The work at this site continues to focus on restoration of an adequate width of spinifex dune along the landward margin of the ocean beach. The original natural dune was largely levelled at the time of the original development.

Four separate site inspections and meetings were undertaken to review earlier work and to confirm and plan the details of the dune restoration work for 2014. The areas to be re-sorted (approximately 100 metres in total) were then sprayed to remove the exotic vegetation and a few weeks later reshaped back to bare sand in preparation for planting.

The 100 metres of reshaped dunes were then planted with 4200 native dune plants by Beachcare volunteers over two working bees, which included help from students from the local Hikuai School.

Works undertaken over the last few years continue to perform well – though ongoing problems with weed invasion continue to be managed. Work in 2015 will continue to focus on restoration of an adequate length of dune along the ocean beach. TCDC also conducted ongoing weed management of the restored areas.

Students from local Hikuai School helped with the restoration plantings.



The dune area had the exotic vegetation removed (above photo) and the dune profile reshaped in preparation for the dune planting working bees (below photo).



Mercury Bay – Cooks Beach

In 2014, dune restoration work at Cooks Beach continued to focus on the eastern end of the beach. Over the last few years, dunes in this area have been progressively restored – with the work now progressively extending westwards alongshore. Several site visits were conducted to review the performance of earlier works and plan this year's work – with a large area of severely weed-infested dune restored along the front edge of three properties. The planting was undertaken by the adjacent landowners as in previous years. TCDC covered the cost of the earthworks to clear the sprayed exotic vegetation. This was followed up with the planting of 7500 dune plants that were supplied by the Beachcare programme and planted by Beachcare volunteers.

The earlier dune restoration continues to perform well with only minimal weed maintenance required. Work in 2015 will focus on the continued westward extension of the dune restoration. A site inspection was also conducted with a local landowner, regarding starting some restoration at the western end in 2015. In addition, liaison will be maintained with TCDC in 2015 with regard to the eastern end of beach, beyond the rock wall, where serious erosion has occurred over last two years. The erosion in this area now appears to have stopped and there is potential to undertake dune restoration to facilitate rapid natural repair.



Before: The dune area that Beachcare volunteers planted in 2014 had previously been dominated by exotic plants such as agapanthus. These weeds were removed before the area was planted by local Beachcare volunteers.

After: The restored area just four months later!



Mercury Bay – Buffalo Beach

Work continues to focus on restoration of a dune along the southern end of the beach, where there had been no spinifex dune until the commencement of the restoration work in 2012.

Several site inspections, meetings and discussions were held to review past restoration and to plan and undertake the 2014 work. A further 100 metres of dune were successfully restored during the year – involving 7500 dune plants. In addition, weed invasion was monitored and managed during the year.

The work in 2015 will focus on continuing the dune restoration along the shore and increasing biodiversity within areas already restored. The local Forest & Bird group is also designing a dune restoration project for the beach and it is likely that some work will be done in association with this group if appropriate plans can be agreed.

TCDC also plans to construct a geotextile sea wall at Brophys Beach. There may also be some

dune restoration planting along the landward edge of this structure to encourage natural dune repair once the beach recovery starts following the erosion of the last 20 years.

The 2014 working bee again had a great turn-out with volunteers planting 7500 native dune plants along a 100m stretch of beach.



The section that was planted in 2013 is looking great!



Mercury Bay – Hot Water Beach

The focus at Hot Water Beach continues to be in central areas where the main car park is located and the surf club development continues. This area is likely to increasingly become the major beach use area over time.

A site inspection was conducted during the year to review work undertaken in 2013. This planting is performing well with an excellent cover of sand binding vegetation now achieved. A working bee was conducted later in the year with the help of Hikuai School, successfully planting isolated areas of damage. Ongoing liaison will be maintained as the new surf club is developed to ensure a good cover of dune vegetation is maintained in this area. Work in 2015 is likely to focus on ongoing maintenance and liaison with minor maintenance plantings as required.

The dune plantings at Hot Water Beach over the last three years are all looking great, especially the addition of pīngao.



Opito and Otama

Liaison has been carried out with landowners during the year and it is planned to visit this site over summer and inspect issues with a view to continue planting in 2015. In addition, ongoing discussions with the Department of Conservation (DOC) continue, with a view to further dune restoration work at Otama. Plants have been provided which will be grown over summer and work will commence in autumn, focusing on enhancing biodiversity and threatened species.



Top: The Otama dunes are a Department of Conservation dune protection area. Beachcare staff will continue to work with DOC staff to manage the biodiversity values of this special place.

Right: Otama also has a number of threatened plant species including sand tussock (in the foreground of this photo), and natural populations of pīngao (in the background)

Below: The Otama dunes have an excellent range of native dune plant species, and minimal weed issues.



Kuaotunu East and West

Three site inspections were carried out during the year to review earlier work. In general the various restoration works are continuing to perform well. However, there are increasing problems with weed invasion (including yucca and agave) which pose a serious threat in some places. Work in this area in 2015 is likely to focus primarily on weed control, but further plantings might also be carried out.

Rings Beach now has a healthy fore-dune with a good cover of spinifex that allow this beach to recover naturally following erosion. However there are still some pest plant issues to be dealt with, such as the exotic ice-plant shown on the left in the photo.

Rings Beach

Two site inspections and a working bee were held during 2014. The working bee focused on continued restoration of sand binding species along frontal dune and plantings of knobby clubbrush and appropriate species landward of this zone – planting 2000 plants.

Work in 2015 will continue to focus on the restoration of native sand binding species on the seaward dune face and spraying out exotics – as well as expanding native plantings further landward.



The erosion at the Matarangi Spit near the harbour entrance.

Matarangi

Dune restoration at Matarangi was more limited than in previous years and focused on completing the restoration work started in 2013. This work involved restoration of part of the frontal dune along Kenwood Drive – over a length of approximately 60 metres. The area was sprayed and cleared and initially planted in 2013. However, the restoration work experienced problems with wind erosion and so further planting was required in 2014 to complete the work. This planting was done through working bees involving adjacent beachfront owners. The work has been successful thanks to the perseverance of the homeowners but in view of the difficulties with this and earlier plantings, further work at Matarangi will be delayed until a more suitable approach can be determined.

In addition, site inspections were conducted with representatives from TCDC, the golf club and individual locals to inspect serious dune erosion at the tip of the spit near the harbour entrance. Interim action was agreed and implemented with TCDC and the golf club. The situation will continue to be reviewed and inspected over summer and in 2015 – with review and further action as required.

Work in 2015 will depend on whether further and/or planting is required to assist the natural repair of the spit erosion once the erosion phase is over.

Top: The troublesome 2013 planting, finally completed this year thanks to persistent owners!

Middle: The restored dune now has a good cover of native plants after previously being dominated by exotic plants, like the area immediately adjacent to the plantings in this photo. The exotic weeds aren't able to trap sand building a dune buffer or self-repair following erosion like native dune plants, and the exotic plants also have a negative impact on the natural character of our beaches.

Whangapoua

The work at Whangapoua in 2014 involved continuation of the 'whole of frontal dune' restoration approach, which started at the northern end of the beach in 2012. This has involved restoring the frontal dune right back to the edge of adjacent private properties. This approach was first adopted here in 2012 based on an earlier development of the approach at Cooks Beach. In that instance, the approach had been successfully used to restore heavily weed-dominated dunes along the length of three properties in 2012 and 2013 (a restored area of 1100 square metres).

Various site inspections and meetings with TCDC and locals took place between June to August to agree on the area to be restored this year, the design of the work and to gain the support of adjacent landowners. The 500 square metre areas of dunes were densely infested with exotic vegetation (especially agapanthus). This area was sprayed and then cleared three weeks later back to bare sand. Large pine trees in the area were also removed. The area was then extensively planted.

Work in 2015 and following years will continue the same approach – gradually working alongshore until most of the frontal dune is restored.

The site has been adopted as part of the National Dune Restoration Trust of New Zealand 'Difficult Sites Project', which develops guidelines for the restoration of severely degraded dunes. The project will also monitor and review the ongoing work at Cooks Beach.



The area restored in 2012 was one of the first areas to trial the "whole of dune" approach. This approach has been a big success and has resulted in less weed re-invasion than other sites where only the fore-dunes were restored. This sequence shows the area before the weeds were cleared, the planting, and then how it looks two years later.



The area restored in 2013 continued the "whole of dune" approach, and helped to further refine the process. Left to right: before, planted and one year later.



The area restored in 2014 before the weeds were cleared (left), and immediately after planting.

Waikawau

Ongoing liaison and discussions continued with DOC in 2014 in regard to potential dune restoration plans for this site. The work included two site inspections and a site meeting. Agreement has been reached to start trial work in autumn in 2015, with further meetings and planning to take place over summer. Plants (including shrubs and trees) will be supplied by the Beachcare programme and will also involve the National Dunes Restoration Trust of New Zealand.

Beachcare groups: West Coast



The 20 hectare area affected by the scrub fire caused by a vehicle stuck in the dunes.



Port Waikato

Port Waikato Beachcare was one of the first community-based dune restoration groups in New Zealand, forming in 1994. The group had been relatively inactive in the last five years, however there had been some local volunteers working with the Department of Conservation to help protect the local population of the endangered New Zealand dotterel that live in the dune areas.

A large scrub fire on the sandspit in 2012 became the catalyst for the Beachcare group to be re-established with a widened focus to include the native bird protection alongside the dune restoration work.

A grant from Waikato Regional Council's Environmental Initiatives Fund enabled the newly formed group to undertake activities outside of the dune restoration activities that the council's Beachcare programme provides. The project is a partnership effort with the group working actively with the Department of Conservation, Ngāti Karewa Ngāti Tahinga Trust and the Waikato Regional Council.

The re-established Beachcare group kicked things off with a dune clean-up day. Seventy volunteers along with DOC staff and Iwi members removed old car bodies and general rubbish and debris that had been dumped over the years and were uncovered by the fire.

Since reforming, the group has held six dune planting working bees with a focus on planting dune 'blow-out' areas and dune forest species in the area cleared by the fire. In 2014, the group held four working bees where they planted 2220 native plants, including 970 coastal tree species.



Some of the rubbish uncovered by the scrub fire that was removed by volunteers.



Members of the Ngāti Karewa-Ngāti Tahinga Trust working alongside community volunteers.



A number of large dune "blow-outs" have resulted from informal access ways and vehicle use. Beachcare volunteers have been trialling erecting "fascines" – brush fences using macrocarpa, to slow down the windblown sand movement. The areas behind the fascines are then planted with native sand-trapping plants such as spinifex and pīngao.

The group has also faced many challenging weather events. Drought conditions over the 2013/2014 summer period were followed by some of the heaviest frosts the locals could recall in autumn. Both events resulted in losses to the tree plantings.

The group will be monitoring the survival rates of the different species, and the impact of controlling pampas regrowth, in their dune forest plots to help with future planning for the area.

Beachcare volunteers have been assisted by staff from DOC to continue their predator trapping programme. This programme aims to protect the birdlife from pest animals and to protect breeding areas for the New Zealand northern dotterels and the banded dotterels.

Another rare native bird species, the Caspian tern, has also been seen at Port Waikato lately, prompting local volunteers to make decoys carved from polystyrene and painted the colours of the terns, in an effort to attract them to the spit. Have a look at the photo on the right and see if you can pick the real thing from the fake!



Local volunteers have been trialling the use of decoys painted to look like Caspian terns to attract the birds back to the Port Waikato dunes. Look closely and see if you can pick the real one amongst the decoys! Photo: Karen Opie.

Aotea

Aotea Beachcare group continued its tradition of Queen's Birthday weekend working bees in 2014, with volunteers planting 180 pōhutukawa and other coastal tree and shrub species. The group is aiming to restore the pōhutukawa forest along this stretch of coastline, starting with a sheltered back dune area adjacent to the walkway they constructed in 2012. Once established, these trees and shrubs will provide a buffer between the restored dune and the pine forest plantation and they will also provide food for native birds and lizards.

The walkway continues to be a success, helping beach users to appreciate the local dune environment while protecting it. The walkway has replaced the myriad of informal paths that were damaging the native plants, allowing the trampled areas to naturally self-repair.

The group plantings included a number of naturally-seeded pōhutukawa that were transplanted to the restoration area sourced from the property of the Morrison family. A number of small pōhutukawa seedlings were also potted up by the local nursery to be used in future working bees – another great example of local eco-sourcing.

The group will be continuing to target pest plants in the dune areas over the summer, with particular focus on marram grass in the fore-dune and gorse, blackberry and a number of pest plant 'garden escapees' which have spread into the back-dune areas.

Below left and right: Rabbits are one of the biggest threats to the dune vegetation at Aotea, so locals are trialling different methods for protecting the plantings without using poison which they would like to avoid as the beach walkway is popular with dog walkers.



The back-dune zone between the pine forest and the Aotea dunes is where Aotea Beachcare members are working to restore the pōhutukawa forest.



Whāingaroa

The dunes at Whāingaroa's Te Kopua domain continued to be the focus of Whāingaroa Beachcare's efforts in 2014, with horticulture students from Hamilton's WINTEC helping with infill planting in 2014. In total, the groups planted 1760 native dune plants before exploring the excellent examples of coastal forest in the surrounding area. The group first visited the kohekohe (*Dysoxylum spectabile*) dominated forest on the Bryant Home walking track, before travelling around the coast to the spectacular Te Toto Gorge – where one of the region's best examples of an uninterrupted 'mountain-to-sea' corridor of native forest still exists.

Beachcare efforts in Whāingaroa continue to be supported by the Waikato District Council, through the installation of beach access ways and innovative fencing that helps to protect the dune plantings. The access ways at Te Kopua have been challenging, with wind erosion issues being common. However, through an 'adaptive management' approach, the problems have been resolved by altering the location and direction of the access ways to fit in with how people use the area and the local conditions.



The realigned beach access way at Te Kopua protects the dune plantings and is more successful than the original access way that was suffering from wind erosion during strong north west winds.



Horticulture students from Hamilton's WINTEC helped infill gaps in the restored dune area.

Ruapuke

There were no Beachcare plantings at Ruapuke in 2014, however weed control and general maintenance continued on the areas that had been planted in previous years. In particular, the back-dune area planted with native trees and shrubs planted at the south end carpark in 2014 are doing very well. The areas of marram grass that were controlled are now being overtaken with native spinach and pōhuehue – two native groundcover species that provide food and shelter for our wildlife.

Beachcare Ruapuke is also currently working on a project with a local landowner that could result in 1300 square metres of retired coastal bluffs and relic dunes being restored to a pōhutukawa dominant forest. This type of forest would have been common in this area before the arrival of people. This is shaping up to be a great project and it could provide a great example for other beachfront landowners in the area.



Houpara at Ruapuke Beach planted amongst dead marram grass that had been controlled by Beachcare pest plant contractors.



NZ spinach is taking over the areas that were previously dominated by the invasive marram grass.



Beachcare and a local Ruapuke land owner are working together to produce a plan to start restoring the pōhutukawa forest along this stretch of spectacular Waikato coastline.

Kāwhia

In 2014, Beachcare Kāwhia continued restoring the dune and coastal vegetation sequence alongside the Te Puia Springs beach access way at Kāwhia's Ocean Beach. This area currently has fore-dune dominated by marram, a back-dune overrun with pampas and the coastal forest zone is planted in pine. Students, teachers and parents from Kāwhia Primary School again helped out, getting stuck in and planting 1500 spinifex and pīngao in the last gap in the fore-dune.

Pīngao from the previous year's plantings are looking great, thanks to the monitoring and rabbit-proofing from members of the Onepu Charitable Trust. Rabbits are a big problem along this coastline, however regular application of rabbit repellent to the pīngao appears to be working. Local members of Maketu Marae are now able to selectively harvest fibre from the pīngao for weaving using the sustainable techniques described in the Dunes Trust Coastal Restoration Handbook (summarised in Edition 3 of the Beachcare magazine).

A further 400 native trees and shrubs were planted amongst the pampas that is currently dominating the back-dune zone, helping to progress the goal of restoring a coastal forest in this area. Trees planted in previous years in this area have done well despite the near-drought conditions of the last two summers. It appears the shelter the pampas provides has also helped retain moisture in this area, helping the trees to survive.

One of the driving forces behind Beachcare Kāwhia, Daisy from Maketu Marae, harvesting fibre from some of the pīngao planted in previous years for weaving.



Marokopa

In 2014, local whānau members with ancestral ties to Marokopa spent a weekend helping to enrich the Marokopa dunes with back-dune plant species such as pōhuehue, sand coprosma and the threatened *Euphorbia glauca*. These species provide habitat and food for native wildlife such as native moths, insects, spiders and lizards.

The use of native coastal shrub species with medicinal properties, such as kawakawa, are also being trialled in the more sheltered areas of the sandspit, with tāngata whenua hoping that these native plants could one day provide a cultural 'medicine cabinet' for local Māori. Pīngao seed is also being collected from the restored population on the sandspit, with a plan to have the local school raise these to seedling size before planting them back amongst the dunes annually.

Beachcare Marokopa would like to thank staff from the Department of Conservation, in particular Dave Smith and Doug Taucher from the Te Kūiti branch, for their pest control work on the sandspit. Dave and Doug have been setting and monitoring traps on the sandspit to protect the native vegetation and birdlife from pest animals such as possums, stoats and hedgehogs.



The Marokopa sandspit.

Pīngao is now well established on the Marokopa sandspit, supporting local biodiversity and providing a resource for weaving.



Nukuhakari

Ngararahae Bay is located on the west coast of the Waikato region between Marokopa and Mōkau. The bay is part of the stunning Nukuhakari Station and is one of the newest and more interesting sites for the Waikato Beachcare programme. The coastline of this iconic sheep and beef station has three beaches that have had their original dune systems significantly altered by cattle access and grazing. This disturbance has led to severe wind erosion and large scale sand drifts migrating inland.

The landowners are now working with Beachcare to reinstate dunes on these beaches to reduce the wind erosion and to enhance the biodiversity of these coastal areas through native plantings. The first planting trials occurred in 2013, where Beachcare staff worked alongside the farm owners and workers and students from the local Waikawau School, to plant 4300 dune plants and 800 trees and shrubs at Ngararahae Bay. These plantings were monitored in 2014 and further infill plantings were carried out to fill any gaps.

The exposed nature of this coastline and the large scale of the sand drifts make this one of the more challenging dune restoration sites for the Beachcare programme. However, Nukuhakari Station isn't alone in facing these challenges with many west coast landowners facing similar issues.

In response to these challenges, the Dune Restoration Trust of New Zealand has successfully secured funding from DOC's Community Conservation Partnerships Fund. This funding will be used for a project aiming to work with local communities and landowners in the Waikato to restore severely degraded coastal dunes at difficult sites. The project will run over the next three years and deliver four 'flagship' examples and detailed best practice guidelines. These will help to actively encourage and guide transformative dune restoration at similar difficult sites around New Zealand.



Students from the local Waikawau School helped out with the first Beachcare plantings at this site.



Ngararahae Bay, one of the beaches located on the coastline of the iconic Nukuhakari Station.



One year later, the first spinifex plantings are doing well at Ngararahae Bay.

Feature - Ecological restoration

Community-based dune restoration programmes, such as Beachcare, are based on the scientific principles of ecological restoration. In this feature, we look at what is meant by the term 'ecological restoration', explore some of the concepts and ideas related to this field, and discuss the implications for Beachcare and dune restoration.

What is ecological restoration?

The Society for Ecological Restoration (SER) defines ecological restoration as “the process of assisting the recovery of an ecosystem that has been degraded, damaged or destroyed”.

It is an intentional activity that initiates or accelerates the recovery of an ecosystem, with respect to its health, integrity and sustainability. Frequently, the ecosystem that requires restoration has been degraded, damaged, transformed or entirely destroyed as the direct or indirect result of human activities.

Restoration attempts to return an ecosystem to its pre-disturbance state or its historic developmental trajectory. In the long term, the aim of restoration is to develop a system that is able to be self sustaining – one that has the ability to maintain its resilience, structure and function over time in the face of external stress.

Restoration occurs along a continuum, where different activities are simply different forms of restoration. For example, Beachcare works with coastal community groups and landowners to restore dune-land ecosystems in varying condition, for differing reasons using a range of restoration techniques.

Often the key driver for initiating a dune restoration project is to reduce the threat to communities from coastal erosion and flooding. These projects tend to focus their efforts and resources on establishing a fore-dune buffer through planting the native sand-binding dune plants spinifex and pīngao, and protecting those plantings through access-way management, temporary fencing, and signage.

At sites where the dunes already have a high level of ecological integrity, like those at Otama Beach on the Coromandel, restoration activities may be focused on protecting the existing biodiversity values from the threats posed by weed invasion and pest animals using various pest control techniques.

On coastal land used for farming and forestry, dune buffers and coastal forest are important for providing shelter and intercepting wind-blown sand. Where the original coastal vegetation sequence has been lost, usually due to grazing or land clearance, sand-drifts can swamp productive pasture and forestry can be stunted by the salt-laden winds. The priority for restoration at these sites is to protect any

remaining dune areas from grazing through fencing, followed by re-establishment of the coastal vegetation sequence through planting.

Key steps in restoration

- 1) Identify processes leading to degradation or decline.
- 2) Develop methods to reverse the degradation or decline.
- 3) Determine realistic goals for re-establishing species and functional ecosystems.
- 4) Develop easily observable measures of success.
- 5) Develop practical techniques for implementing these restoration goals.
- 6) Document and communicate these techniques.
- 7) Monitor key variables, assess progress of restoration relative to the agreed upon goals, and adjust procedures if necessary.

The production pine forest located behind the dunes at Kāwhia's Ocean Beach has a permanent shelter belt of macrocarpa and pine trees to protect the plantation from the salty coastal winds. However, these exotic tree species are less tolerant of sand encroachment and salt, and many of the shelter belt trees are now dying. Through an ecological restoration process, this shelter belt could be converted to native coastal forest consisting of species such as pōhutukawa, karo and karaka. This strip of native forest would tolerate the harsh coastal conditions while still providing protection to the commercial pine forest. It would also have the added benefits of providing food and shelter to native wildlife and enhancing the natural character of the coastline.



Ecological restoration and volunteers

Benefits for volunteers

In the quest for balance between nature and development, ecological restoration is critical to ensure the existence of New Zealand's natural areas. In addition, restoration provides one of the most accessible ways in which local communities can become actively involved in nature conservation and see positive outcomes as restoration develops through time. Because volunteers are crucial for most restoration projects, it is important to explore why individuals contribute the time and effort necessary to carry out these enormous tasks.

Research on restoration and volunteers has shown that the restoration of natural areas is beneficial not only to the plant and animal species whose habitat is revived and healed, but also to the individual volunteers who take part in the restoration process.

One of the benefits of participating in restoration activities is an overall sense of satisfaction. Ecological restoration participants may also derive a variety of specific kinds of satisfaction from their involvement, such as the satisfaction associated with a sense of accomplishment or making new friends. Becoming involved in local restoration projects also offers many of the satisfactions offered by nature activities, from getting away from



one's normal routine to providing a source of fascination. In addition, like other environmental or conservation activities, involvement in restoration activities offers the opportunity to be part of something meaningful, and the satisfactions of social or community involvement. Finally, like other leisure activities, ecological restoration can also provide opportunities for physical satisfaction.

Ecological restoration networks in NZ

Over the summer period, Beachcare staff have been busy collating all the data and photos we currently hold for each Beachcare group so this can be shared on the Nature Space and Ripple Effect community group networking websites. This will give Beachcare members better access to their group's records, and will add valuable data to the nationwide picture of restoration activities. If you would like to be involved in helping to administer your group's page, please contact the Beachcare coordinator at the Waikato Regional Council (see back page for contact details).

The Ripple Effect

In 2013, Waikato Regional Council launched a major new project called The Ripple Effect to celebrate the work of community groups and individuals and to help boost involvement in environmental initiatives in the Waikato region. A key feature of The Ripple Effect website is its ability to link the organisers of environmental improvement projects with volunteers wanting to get involved. Groups looking for volunteers or funders for a particular project can use the site to promote their project, while those wanting to get involved can sign up to projects that interest them. www.makearipple.co.nz

Nature Space

Nature Space is a website for groups, individuals and landowners undertaking ecological restoration in New Zealand. There are hundreds of community restoration groups and individual landowners across New Zealand dedicating time and effort to restore our native ecosystems. The Nature Space website supports these people. Here you will find information about some of the community restoration groups and individuals working throughout New Zealand, maybe in your own neighbourhood, as well as resources to help you or your group get the best conservation results. www.naturespace.org.nz



Feature - Ecological restoration

Key concepts

Zonation

A key feature of dune vegetation is the sequence of different vegetation communities or zones that occur with increasing distance landward from the sea. Each zone in the vegetation sequence has a different species composition that is related to the ability of the plant species to withstand environmental factors prevailing in that zone, such as sand deposition and burial, salt spray episodes, sand movement, wind velocity and sand blasting. These stressors vary with increasing distance inland and with dune landforms.

Variations in the physical environment result in ecologically distinct communities of plants and animals. The most seaward vegetation zone on New Zealand dunes tends to consist of sand trapping and dune forming species such as spinifex and pīngao. Further inland where sand burial and movement is reduced, the dune building vegetation typically gives way to vegetation communities composed of vines, sedges, and low woody plants. In pre-human dunes, the ground-cover zone gave way to our coastal forests.

While the original vegetation sequences on most New Zealand dunes have been significantly destroyed or altered since human settlement, the underlying ecological processes that form these zones are still there and need to be taken into account when planning dune restoration.

Succession

Succession is defined as a change in species composition within an ecosystem over time. On dunes, the term succession is typically used to refer to the evolution of plant communities over time following disruption – i.e. from the pioneer species which initially colonise the bare sand following disruption right through various successive stages to some form of “climax community” where the vegetation is in dynamic equilibrium with the environment.

At each stage of succession, the plant community alters the physical environment (e.g. soil organic matter, light/shading, improved shelter, microclimate, change in nutrient levels in soil) allowing the establishment of another later group of species better adapted to living in the changed environment.

Reference sites

The use of “reference sites” can be useful for helping to set targets for restoration projects. A reference site is an ecosystem that serves as a model for restoring another ecosystem. This implies that the reference site has more intact ecological processes, higher functionality, and greater diversity than the system to be restored. The physical site conditions of the reference site also must closely match those of the restoration site.

Reference sites can be either less disturbed portions of the landscape in close proximity to the restoration site, or when the restoration site is an isolated fragment the only option may be a more distant, relatively intact site that occupies a similar topographic position in the landscape. Usually more than one reference site is considered when seeking guidance in the design of a restoration. There can be multiple sites that represent a time sequence of succession typical for a specific ecosystem. This is especially important when the site to be restored is highly disturbed and lacks any biological legacy.

Over the page, we take a closer look at some examples of dune-land sites in the Waikato that can be useful as reference sites for dune restoration.

References for further reading

Dahm, J. *Zonation and Succession on Coastal Sand Dunes*. Dune Restoration Trust of NZ - Technical Article No 2.4. 2014.

SER International Primer on Ecological Restoration. Society for Ecological Restoration. www.ser.org.

Miles, I. et al. *Ecological restoration volunteers: the benefits of participation*. Department of Natural Resources and Environmental Sciences, University of Illinois at Urbana-Champaign. 1998.

Hobbs, R.J, Norton, D.A. *Towards a Conceptual Framework for Restoration Ecology*. Restoration Ecology Vol.4 No.2, pp. 93-110. 1996.



The lack of weeds and a native seed source nearby has allowed the dune vegetation in the back-dune zone at Otama to follow a natural successional pathway from ground-covers to coastal forest. In this photo, pōhutukawa and karo shrubs can be seen beginning to emerge through the shelter provided by the knobby clubrush and pōhuehue.

Beach profiles

Oioroa (Aotea scientific reserve) – West Coast

The Department of Conservation's scientific reserve at the north head of Aotea harbour (also known as 'Te Tehi I Oioroa') is located on the west coast of the Waikato region. It is one of the region's best examples of duneland ecosystems. Oioroa includes the most extensive example of a 'transgressive' (or moving) dunefield in the Waikato. The 588 hectare reserve also features other dune ecosystem types such as deflation plain wetlands (where temporary wetlands are created in dune hollows), a dune lake and a dune forest. The dune plant communities found on the mobile, drifting sands in particular are very useful as 'reference sites' when restoring the large sand drifts that occur on the west coast as a result of cattle grazing.



Only a limited number of species can survive the dynamic nature of the transgressive dunefield environment. A distinctive community of spinifex, tauhinu and toetoe are the first plants to become established. Eventually, these plants will help stabilise pockets of the dunefield, allowing a wider range of dune plants to become established in these areas.



The incipient (forming) fore-dunes are dominated by the dune pioneering plants spinifex, tauhinu and sand convolvulus. Immediately landward of this is a dune swale (depression) that is dominated by knobby clubrush.



A rare dune forest has formed in the more protected part of Oioroa with a canopy dominated by kākūka, māhoe and cabbage trees, and an under storey of coprosma rhamnoides and kawakawa.

Otama Beach – Coromandel Peninsula

Otama Beach on the Coromandel Peninsula, a DOC dune protection area, is a 2275 metre long intermediate sloped beach with headland barriers at each end and extensive dunes with clear patterns of dune 'zonation' (the sequence of vegetation communities that occur with increasing distance from the sea). A feature of Otama Beach is the presence of a variety of dune plant species that are classed as 'at risk – declining' including sand tussock, pīngao and sand coprosma. The beach also provides an example of the 'succession' (a sequence of vegetation change through time) of the more stable landward dune areas from back-dune sedge communities to coastal forest.



A coastal forest has begun to form in the stable back-dune area of the Otama dunes amongst the knobby clubrush, sand coprosma, and pohuehue. This forest has only a small variety of tree and shrub species with pōhutukawa and karo emerging through the mingimingi, manuka, and kanuka shrubs. Other tree species in this developing coastal forest, but not as common, include akeake, karamu, mapou, and ngaio.

Beachcare education: Monitoring guidelines



Assessment of dune vegetation cover is best carried out by sampling across the different zones that typically run parallel to the shoreline from seaward to landward. Placing transects or plots perpendicular will provide an indication of the different zones.

What is monitoring?

Monitoring can be defined as assessing the progress or state of something over a period of time. This requires establishing a 'baseline' against which to measure change over time using standardised methods and protocols that can be repeated at defined intervals. This will provide a record of trends to identify any significant changes that may be occurring in the ecosystem. In the context of dune restoration, a robust monitoring system will allow Beachcare groups to learn directly from their monitoring programmes and implement changes to improve future outcomes.

Essential steps

Effective dune restoration requires a staged process of assessment and monitoring including the following essential steps:

Site assessment

The first step in any dune restoration project should be undertaking an evaluation of the current state of the beach and dune system, for example, assessing the type and extent of existing vegetation cover. It is important to determine the key factors influencing dune degradation, such as ongoing pest animal damage, and the extent of weed species.

Restoration planning

Another essential step is the design and implementation of a prioritised restoration plan that addresses key factors, such as undertaking weed and pest control, planting of natives.

Monitoring

The systematic and ongoing recording of change over time at the restoration site is critical in determining whether restoration initiatives are meeting objectives stated in the restoration plan. For example, measuring the performance of planted seedlings, recording the number of possums caught in traps.

Dune assessment

Dune assessment helps to establish a baseline so that changes in vegetation cover and species composition can be monitored over time. Key components to include in an assessment include sampling change in vegetation cover and species composition (both native and exotic) along transects running perpendicular to the coast, and linking this vegetation cover to dune morphology (e.g. fore-dune slope, dune crest, swale, lee slope) and distance to the sea. By determining both the characteristics and the drivers of vegetation patterns and species composition, appropriate restoration actions can be developed, such as selection of the best species for specific zones.

Monitoring: A dune assessment team measuring and recording a stand of pīngao. (photo courtesy of David Bergin, Environmental Restoration Ltd)



Dune monitoring – restoration plantings

The most common restoration activity undertaken by dune restoration groups is the planting of natives on fore-dunes and back-dunes. Success of planting programmes should be measured on the basis of what has survived and established at least two years after planting, rather than on how many seedlings were planted during the working bee!

There are some easy ways in which dune restoration groups can evaluate the success of their restoration efforts on both fore-dunes and back-dunes. Some commonly used techniques for assessing the success of dune restoration plantings are outlined over the page.

Assessing dune vegetation

Assessing dune vegetation cover is a key tool for identifying the natural plant communities that exist at a dune site, establishing a baseline, and monitoring the success of restoration plantings and other management techniques. Observations can be made at sample points, within defined areas (sample plots), or along straight lines (transects). Features to measure include the number of plants, proportions of different plant species, proportion of ground covered by plants, plant height, and plant health and vigour.

Sample points

Sample points can be established by erecting a marker with an ID tag that has a pre-determined number of plants around it. These can be revisited and the plant survival and growth rates measured. For example, tree and shrub plantings in a back-dune environment can be planted in groupings of six trees, 1.5m apart, located around a central marker.

Sample plots

Sample plots are marked on the ground in pre-selected positions. Plot dimension should relate to the purpose and plant size and spacing – 4m x 4m plots are adequate for measuring areas where grasses, sedges and herbs predominate, while larger plots up to 10m x 10m or more should be used where trees or shrubs are present.

Transects

Sample points or plots can be located at intervals along straight lines (transects).

For dune restoration projects, valuable data can be obtained from measuring sample plots along a transect that runs perpendicular to the shoreline from the high tide line to the landward extent of the restoration site. Plots should be established along the transect within the various vegetation zones represented at that site – for example, a fore-dune plot, back-dune ground cover plot, and a shrub-land plot.

Photopoints

Photopoints are simply photos taken at different times, but in the same place. They provide a readily-understood visual record of the condition of an area of interest, a sample plot, or an individual plant. Photopoints are a great way of recording the outcomes of your restoration projects, as they track the appearance of your site in pictures over time. For information and tools regarding photopoints, we recommend the QEII National Trust website: www.openspace.org.nz.

References for further reading

Bergin, David. ERL Ltd. *Monitoring Coastal Sand Dunes – an introduction*. Dune Restoration Trust of New Zealand Technical Article No.14.1. 2014.

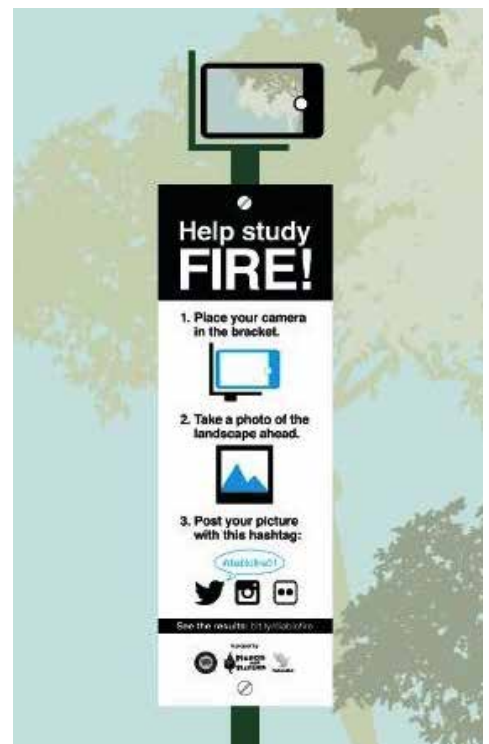
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Miller, E. Paul, T. CDVN. *Measuring Success – Guidelines for the Management of Sand Dune Revegetation Methods*. CDVN Technical Bulletin No.6. 2007.



Above: An example of photopoint monitoring of a forest restoration site over three years. Photos taken by Miles Giller, as shown on www.openspace.org.nz.

Below: An example of how the monitoring brackets and signage are being installed at restoration sites in California (USA).



Monitoring ecosystems with time lapse photography

A new idea coming out of America in the world of ecological restoration monitoring uses little more than a camera phone and a stout piece of bent steel to track long term changes. A piece of angled steel is firmly mounted to provide a consistent height, angle and direction from which to shoot images using nearly any camera. Photos are then uploaded to one of several social media services, where a programme collates the publicly available images



and compiles a time lapse video to show changes over time. In America, signs with brackets are being installed at national parks inviting park visitors to take pictures at pre-defined locations, aligning their phones against the simple angle bracket that ensures images will centre on the same area. This simple set up is a powerful tool for promoting environmental education while harnessing the enthusiasm of citizen scientists to generate important scientific data. For more information, please visit www.monitorchange.org.

Websites featured in this edition



Dune Restoration Trust of New Zealand:
www.dunestrust.org.nz



Nature Space:
www.naturespace.org.nz



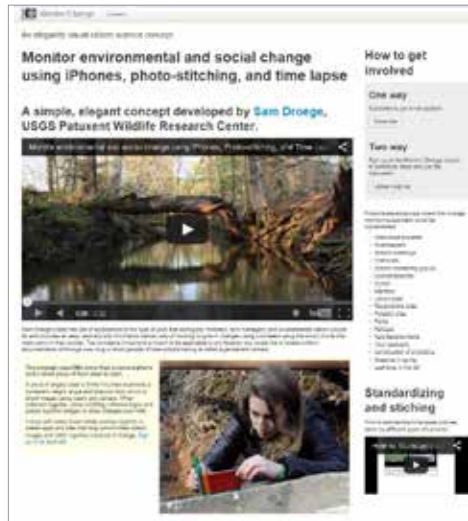
The Ripple Effect:
www.makearipple.co.nz



QEI National Trust:
www.openspace.org.nz



New Zealand Plant Conservation Network:
www.nzpcn.org.nz



Monitor Change:
www.monitorchange.org

Key contacts



Our Beachcare coordinator at the Waikato Regional Council is **Sam Stephens**. Sam is the key contact for the Waikato Beachcare programme, and coordinator for the west coast groups.

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