

### Update from Mark Dean

As I write this we are in the midst of a freezing cold winter's evening with a stiff south easterly driving the rain. It's quite snug in front of the fire. At least we are now past the shortest day and the seed has begun to germinate in the greenhouse. Roll on the warmth of summer.

Planting on the dunes is in full swing and lots of Spinifex and Pingao has passed through our Tauranga nursery on its way from Whakatane and to the coast care groups around the country. Judging by the number of truck loads, a good proportion of the planting for this year has already been done. Hopefully the winter storms will be kind to the efforts of all those keen volunteers.

The year so far has been busy for the Dunes Trust. Since our last newsletter we have welcomed Jody Bond as our Dunes Trust co-ordinator. Jody is based in Rotorua and replaces Natalie Miller. You can contact Jody at [info@dunestrust.org.nz](mailto:info@dunestrust.org.nz).

Our Conference in Timaru was a resounding success and thanks must go to Gary Foster of the Timaru District Council for the incredible input he made to a great few days, and to the TDC for their support. Without the sponsorship and assistance from our supporters these events would not be possible. I still marvel at how Gary and the council co-ordinated the display of Hector's dolphins at lunchtime on the Friday field trip.

At conference our two awards were made: - Best Coastal Dune Restoration Project Award sponsored by Naturally Native went to Timaru District Council for their restoration of the dune system in Caroline Bay.

This project was a really great and successful effort with stunning results. The Best Community Group Award sponsored by Taupo Native Plant Nursery went to the Southshore Residents Association. This group has been actively involved in the management of its local beach reserve known as the 'Southshore Spit Reserve' and in advocating for the whole South New Brighton Beach environment. Congratulations to these winners.

Our workshop programme has been successful and to date we have had workshops in 7 locations throughout the country. The last two were in Christchurch and Timaru prior to our conference in March. Dave Bergin has put in a huge effort to make these workshops the success they are and he deserves our wholehearted congratulations. More workshops are coming up so if one is being held nearby make sure you attend. It is well worth it.

Over the past year the Dune Restoration Trust board has been working hard to secure funding and thanks to the efforts of Harley, Robin, Dave and Jim we have been successful in establishing a sponsorship relationship with Quinovic Property Managers. The relationship with Quinovic is a very positive one and the board is keen to see this grow in the future. However funds are still tight and so we have cut one of the Board Meetings in Wellington. The next meeting will be held in September. In the meantime the management committee and Jody are keeping things under control.

Mark Dean - Chair



## Events 2010

### Adapting to Climate Change Southland Workshops 2010

**Invercargill, Friday 10 September**

**Contact: Gary Morgan 021 784 963**

**[gary.morgan@es.govt.nz](mailto:gary.morgan@es.govt.nz)**

**Dunedin, Saturday 11 September**

**Contact: Renee Gordon 03 477 4000**

**[renee.gordon@dcc.govt.nz](mailto:renee.gordon@dcc.govt.nz)**

**[www.dunestrust.org.nz](http://www.dunestrust.org.nz)**

# Dunes Trust Conference Overview

## Timaru Conference Fieldtrip Report. Gary Foster, Timaru District Council

The object of the Timaru Conference Field trip was to show delegates the unique qualities of some typical east coast South Island sand/gravel beaches and discuss some of the issues they face and opportunities that they present.



Our first stop was South Beach located adjacent to the Port of Timaru. We observed the accretion occurring due to the harbour establishment which has resulted in approximately 60 hectares of additional land. We discussed the coastal processes at work along the coastline which brought about this expansion. We talked about the increased recreational use of the beach and looked at the tussock seeding trials being undertaken in the area.



Our next stop was Otipua Beach further south which is separated from South Beach by Patiti Point. Another sand/gravel beach, Otipua Beach has a Marram-dominated dune system where there have been significant plantings of native coastal species in conjunction with the development of the walkway/cycleway along this beach. Here we admired the Spinifex which is considered to be the southern-most Spinifex planting currently undertaken in New Zealand. We also looked at some developing Pingao plantings which are showing signs of building a dune in front of the Marram. We discussed the lizards which live along this stretch of coast and some of the initiatives that have been undertaken to improve their habitat. The wetlands behind the beach dune system here provide a habitat for a wide range of birds, and the sand/gravel beach systems provide a habitat for a large number of coastal seabirds, many of which are under threat from increasing and often inconsiderate recreational users.



At Hook Beach near Waimate (left) we met representatives of the local Maori community who recounted some of their history in the area and talked about the wildlife and some of the changes occurring to the beaches and landscape. We were very fortunate to observe some Hector's dolphins swimming close to shore which, having heard about these amazing mammals at conference the previous day, made it all the more special. On the beach we noted the Shortland/Selwyn memorial commemorating the place where Bishop Selwyn and Edward Shortland met on 16 January 1844.

After lunch we travelled to Lower Wainono to find an impressive greywacke-dominated gravel beach where we observed some of the Muehlenbeckia-rich plant communities that grow here. Side by side can be found *M.complexa*, *M.ephedroides* and *M. axillaris* along with some naturally occurring hybrids - a great habitat for lizards.

Dairy development along these coastlines and throughout Canterbury in general is impacting on coastal plant communities, especially the backdune salt meadows. In recent years, many of these salt meadows have become significantly depleted or have disappeared entirely. Our local beaches here in Timaru and its environs are very special places (as indeed are everyone's local beaches) and in many cases totally different from beaches found elsewhere in New Zealand. It was our pleasure to be able to show them to you.



# Conference Overview Continued

## South Beach Seeding Trials. Gary Foster

South Beach in Timaru is a typical east coast South Island sand/gravel beach. Not so typical, however, is the fact that South Beach is accreting while many other similar beaches along the Canterbury Bight are eroding.

The accretion is due to the construction of the Timaru Harbour Breakwater which began in 1878. The breakwater interrupts the flow of the ocean current travelling up the east coast of the South Island which brings with it gravels from major rivers, such as the Waitaki, as well as material eroding from coastal cliffs etc. The heavier gravels become trapped by the breakwater and build up on the windward side while the finer sands and sediments are carried around the end of the breakwater and accrete in the calmer water on the leeward side (where over many years they have formed Caroline Bay as we know it today).

The growth in South Beach has been quite rapid from a geological point of view. As a result, the beach has accreted, in some places, up to 200 metres further out from the coastal cliffs where it once lay in 1878. The speed of the beaches accretion has also outstripped the ability of the native coastal plants (that grew along the coastal beaches and cliffs) to keep up with the beaches growth. These areas are now dominated by exotic plant species such as lupin, yarrow and rough grasses.

One exception is the native Sand Convolvulus – *Calystegia soldanella* - which is present in good amounts above the high-tide line on the beach before the lupin begins. In recent years, a coastal walkway and accompanying native coastal plantings have been established along South Beach. Early in the planting programme it was noticeable how the tussocks seeded, particularly the Silver Tussock – *Poa cita* - and how they were able to establish in proximity to the parent plants.

In 2006 as part of a Taskforce Green work scheme, we collected seed from *Poa cita* and broadcast this at random over some of the

lupin-dominated area to see if we could establish some alternative cover. For a couple of years it appeared that nothing was going to happen but then a number of seedling tussocks began to appear over the areas we had broadcast the seed.

This development gave impetus for further seed collection and sowing over this current 2009 / 2010 season, to see if we could build on our earlier success but over a larger area.

Seed of several species was collected and sown including Silver Tussock – *Poa cita*, Sand Tussock – *Austrofestuca littoralis*, Hard Tussock – *Poa colensoi*, and the Orange Sedge – *Carex testacea*. We had also noticed the occasional Taupata – *Coprosma repens* - seedling in the lupin areas which had come from some adjoining plantings. Consequently we decided to collect and spread some of this seed along with Flax – *Phormium tenax*, South Island ToiToi – *Cortaderia richardii*, Tauhinu – *Ozothamnus leptophylla* and Shore Ribbonwood – *Plagianthus divaricatus*, this season.

Seed of all species was gathered by hand as it matured on the parent plants and was simply broadcast over the lupin-dominated areas with no special treatment at all. No fertilisers were applied to the area as we felt this would also encourage growth of the exotic plants. However, there has been some ongoing pest control for rabbits through the area. This was initiated primarily to protect the plantings associated with the walkway rather than the seedlings but has had a positive outcome for both.

Will we be successful? I don't know but results to date have been encouraging. It is certainly a low-cost way of introducing native seeds into areas where the natural spread would take significantly longer and where, for the most part, the purchasing and planting of nursery-grown plants was never going to be an option. Collecting and dispersing the seed can be done by anyone with half an hour to spare or can simply be undertaken while strolling through these areas.

## Congratulations to the 2010 DRTNZ Award Recipients!

### Best Community Group Award 2010 Southshore Residents Association



Pieter Borchers (right) from Christchurch City Council, accepts the award on behalf of the Southshore Residents.

The Dunes Trust 'Best Community Group Award' is proudly sponsored by:



### Best Coastal Dune Restoration Project Award 2010 Timaru District Council



The award was presented by Mayoress Janie Annear to Bill Steans and Gary Foster.

The Dunes Trust 'Best Coastal Dune Restoration Award' is proudly sponsored by:



# Conference Overview Continued

## Summary of Shingle Beach Presentation. Susan Wisser, Landcare Research, Lincoln

In contrast to sandy beaches, shingle beaches are comprised of water-smoothed gravels. Gravel/shingle beaches occur where rivers deliver large quantities of gravel to the coast or where gravel is being eroded from the coastal cliffs. They often rise to a ridge that is rarely disturbed; a lagoon may be impounded behind. As part of a research program on New Zealand Ecosystems that have always been rare, Susan Wisser and her team studied the plants and invertebrates of this poorly understood ecosystem. From 2006-08, the team completed sampling plants and invertebrates on 61 shingle beach sites around the New Zealand coast.

Many of the sites sampled are highly modified by exotic plants and animals, but some still have a significant, and often distinctive, native component. At a national scale, environmental measures derived from geographical location (i.e. climate variables) explain differences among beaches.

The proportion of exotic plant species increases on drier, warmer beaches, whereas rare native species are broadly distributed geographically. Within regions, the nature of the adjacent vegetation is important, with native species more abundant on sites adjacent to indigenous shrubland or forest than on sites adjacent to farmland or residential areas. Within-site composition is related to stoniness. There are significant floristic affinities to the floras of braided riverbeds, coastal sand dunes and coastal turfs; such affinity is related to the proximity to these ecosystems and microhabitat characteristics. In contrast to plants, there is no evidence for geographic patterns in the distribution of invertebrates of different orders. It appears that the composition of belowground invertebrate communities on gravel beaches is mostly related to plant composition, particularly the presence or absence of exotic plants.

Important serendipitous discoveries from shingle beaches, gumlands, granite sandplains include:

1) new native species (e.g. *Hydrocotyle* at the mouth of the Wilson River in Southern Fiordland);

2) distribution extensions (e.g. rare shrub *Muehlenbeckia ephedroides* extended its northern limits within the Marlborough Sounds by 50 km, a rare egg laying peripatus (velvet worm), *Ooperipaltellus veridimaculatus* from one of the few shingle beaches on the South Island West Coast) and

3) several potential biosecurity threats (e.g. the exotic grass *Avena barbata* first recorded in the South Island on the Nelson Boulder Bank; exotic ant *Hypoconerina confinis* at Turakirae Head, Wellington).

As well as providing some basic understanding of the ecology and biodiversity of these systems, our results have the practical application of providing the information required to set conservation priorities and to guide restoration efforts.



# Regional Round-up

## Coastcare Bay of Plenty. Compiled by Jody Bond, DRTNZ Coordinator

Fore dune plantings are doing well in the Bay of Plenty thanks to coastal staff at Environment Bay of Plenty (EBOP) and their coast care groups with some 80,000 plants being put in over the 2009 planting season. Weed and pest control continues to be a priority for EBOP Coast Care Coordinator Pim de Monchy. EBOP is partnering with keen weed-busters by sponsoring them through a Growsafe introductory certificate and will follow an agreed weed control plan between qualified volunteers and Western Bay of Plenty Reserves staff.

The BNZ "Closed for Good" volunteer day in November last year was a huge success and resulted in the entire length of the Pukehina beach foredune being covered with fertiliser. The result of this application is evident by the healthy and vigorous plant growth on the dunes.

Dune driving appears to be on the decrease as BOP beachgoers take more care on the region's dunes. However, there are still a number of drivers continuing to cause damage with their vehicles. Pim says one of the most badly damaged areas is from Otamarakau to Whakatane. In some spots the native dune plants have been completely destroyed and there are numerous vehicle tracks and blowouts and evidence of erosion. Pim notes that dotterel and other birds on the beach have also been affected by dune-drivers disturbing and destroying nests.

Coast Care, a joint community and local government programme, has sponsored the area's two largest fishing competitions since 2008 to help raise awareness of the damage vehicles can cause.

Cash spot prizes are offered to competitors but those seen driving or parked on dune vegetation are unable to claim their prize. Pim reports that since the initiative began, the number of competitor's driving on dune plants has decreased from 80 in 2008 to just five in this year's Easter competition. Pim says people seem to be getting the message. The challenge now is to restore the damaged dunes and to increase awareness of bird nesting areas as well as dune plants. Keep up the good work Pim!

**Evidence of driving on dunes (below) and recent EBOP signage.**  
**Photos: EBOP**



## Te Roopu Whakaoranga O Te Taha Moana Trust. Compiled by Jody Bond, DRTNZ Coordinator

It has been another busy year for Betsy Young, James te Tuhi and the team in the far north. Their small volunteer group has a vision to restore, preserve and utilize the coastal resources of pingao and toheroa and are working to establish these taonga along their local shorelines. Work this year has been concentrated on propagation in their pingao nursery for plant supply to their coast care group in the far north. A poly-house has also recently been established and is intended to hold at least 10,000 pingao plants.

The group has been documenting various aspects of their work in creating pingao colonies along their coastline. Monitoring growth and recording observations specific to germination, propagation, and planting out, has guided processes to ensure maximum results. Information gathered has also included the survival rates of replenished colonies and the impact of shifting sand dunes on pingao colony restoration projects. Field trips for school pupils have also been organized so students can visit the nursery at Ngataki to gain practical knowledge on seed-raising and propagation techniques. The group hopes to set up a second nursery closer to local schools and community groups which could function as an education centre. The provision of conservation-themed educational resources complementing the school curriculum are also in the pipeline.

Many Northland school students have sat enthralled while local storyteller, Gill Taylor, has used the group's book about pingao called 'Nana's Koha' to educate pupils about dune restoration. The group is planning to produce another series of books around pingao, toheroa, and their associated flora and fauna. For more information and to read the legend 'the Eyebrows of Tane' visit the group's website [www.whakaoranga.org.nz](http://www.whakaoranga.org.nz).

Pingao is one of the four main native fibres used by iwi for weaving. The leaves are dried and used extensively on Tukutuku panels in the whareniui. It is also used for making kete (bags), potae (hats), and whariki (mats). Betsy and her team also work with school children conducting weaving classes. The group has also recently completed a tukutuku panel for the Far North Rural Education Activities Programme (REAP), to acknowledge REAP's support in the work that the group does with pingao.

On the 8th of April this year, Betsy received a "Community Hero" award for her priceless contribution to the local Ngataki community. The award acknowledges the many hours she volunteers in various capacities including her role and work in propagating and planting pingao and coordinating events to get youth involved in dune conservation. It was a privilege to meet Betsy, James, and Harold Matthews at our March conference in Timaru. We are looking forward to tasting more of James' delicious toheroa soup at next year's conference.



# Regional Round-up continued

## Progress at Dunedin City Beaches. Renee Gordon, Coastal Parks Officer, Dunedin City Council

Last year's Dunes Trust Conference in Piha was my first since starting work at the Dunedin City Council (DCC), and indeed since starting work in coastal management after finishing my Marine Biology degree in Sydney in 2008. It was brilliant learning from the Trust leaders, industry peers and also talking to local community group members. It really helped me focus my ideas on coastal management priorities for Dunedin. Dunedin's beautiful fine white sand-covered beaches are home to many rare species of wildlife but are extremely exposed to erosive forces that damage our marram-covered dunes. As the Coastal Parks Officer it is my job to manage the 17 or so coastal areas along the Dunedin coastline which fall under the DCC's jurisdiction. I also manage inland sites that contain water or open drainage systems, implementing soft options to improve water quality and biodiversity and reduce erosion; an holistic approach to water management.

We have been extremely busy since the Piha conference developing and implementing new coastal programmes to increase community awareness, ownership and understanding of our coasts. We have begun installing signs on our coastal sites educating reserve users about the importance of coastal management. The design of the signs allows the information panels to be changed and updated regularly at little cost. In partnering with schools and other agencies (including the NZ Sea Lion Trust and the Portobello Aquarium), the signage has been well received. By June 2011 we hope to have at least one sign frame installed on each coastal site. In 2009 we began developing the Otago Coast Care Code in partnership with DoC and the Clutha and Waitaki District Councils. This will hopefully be completed soon.

Beach access for those less able-bodied people in Dunedin is something I am passionate about and we now have a list of accessible coastal areas on our website. The 2009 summer edition of the Muscular Dystrophy Association's In Touch magazine featured an article about our accessible coastal sites. I hope that in future we will be able to introduce to Dunedin beach wheelchairs and maybe even the odd boardwalk. This kind of project has been floated for Brighton and has been added to the Community Boards LTCCP, so watch this space.

Dunedin's Coastal Dune Reserve Management Plan is now complete and was well received by the community. Plans are underway to make this plan functional on an operational level. I hope that the plan will also provide a basis to apply for coastal-specific funding which we don't have at present. The only major beach area not covered by this plan is Ocean Beach, our main city beach. Ocean Beach is currently experiencing a cycle of severe erosion and has been declared an emergency area. Emergency erosion mitigation works are being undertaken to maintain a holding pattern while we collect data to assist in the production of a long term plan of action.

In the meantime, we continue work on the rest of the coastal sites. Despite an increase in funding available, we have stopped all large scale coastal projects. Previously we were doing just one large project per year in one community, leaving many coastal communities with no funding whatsoever. Some communities hadn't received funding for more than 10 years resulting in a breakdown of relationships. We have instead been running small, manageable projects in every single community, developing new relationships with all of our community groups and helping to facilitate each group's functioning. This work has included the signing of a Memorandum of Understanding with each major group, along with the production of basic 5-year mini-plans to help focus priorities.

This year we have signed on as a UN partner for the International Year of Biodiversity 2010. We have produced a calendar of events that celebrate biodiversity and includes our Let's Grow Native campaign. We wanted to showcase the importance of biodiversity in Dunedin and celebrate our hardworking volunteers and their projects. As a committee member I was able to champion the inclusion of many coastal projects in the events calendar. To date the events have been well attended and by the end of the season we will have planted more than 8900 plants on our coastal sites. We are also supported by a local newspaper, The Star, which runs advertising for the events and informative articles supplied by the DCC. The campaign has been really successful at reaching the wider Dunedin community. Our biodiversity webpage [www.dunedin.govt.nz/biodiversity](http://www.dunedin.govt.nz/biodiversity) has all of the media releases available as well as event information, educational material and post-event updates. The Dunes Trust workshop which will be held in Dunedin in September is highly anticipated.

Our pingao recovery work continues. The pingao borders in roading plots along Ocean Beach continue to grow well as do the many natural areas of pingao growth. Over the last five years the Brighton SLSC reserve has been almost completely revegetated and looks stunning. Long Beach now has four major plots of pingao which we hope to join together over the next few years. Waikouaiti Beach has pingao along most of the main beach, although we did lose about 3000 plants during last year's storm events. Island Park Reserve, adjacent to the Kaikorai Estuary, was the site of the last remaining stand of pingao in Dunedin. The pingao dune has been extended there to now cover a large area. Okia Reserve on the Peninsula continues to support pingao in small plots near its access points. Warrington Beach has a small plot of pingao growing next to the surf club and has been well received by the community so we hope to start some plots down on the beach. The main beach at Brighton has a small plot growing, managed by a local community member, which we hope to extend over time, and we will shortly be introducing pingao to Kuri Bush, a small beach down near Taieri. Finally, the Tomahawk Smaills Beachcare Trust are raising pingao in their nursery which we hope to plant along the access points to add to those plots planted a few years ago. We have also partnered with the local Yellow-Eyed Penguin Trust nursery which will supply us with pingao annually at a rate we hope to increase to 10,000 plants per annum over the next few years.

Next year is going to be a bumper year thanks to some increased funding as well as a generous donation from Telecom. We will be planting 13,225 plants on our coastal sites, more than triple the number in 2009. I'd be more than happy to show Trust members around these areas if they can get to Dunedin for a visit.

Email: [renee.gordon@dcc.govt.nz](mailto:renee.gordon@dcc.govt.nz); [www.dunedin.govt.nz](http://www.dunedin.govt.nz)



*Renee Gordon presenting at the conference.  
Photo: Greg Bennett*

# Regional Round-up Continued

## Coastcare Northland Update. Laura Shaft, Northland Regional council

As most people will know, we've had an extremely dry summer up here in Northland. This has been very hard on the farms, but the dune plants, especially the spinifex, have thrived in the hot and sunny weather. The long awaited rain that we are finally getting is very welcome though as planting season approaches.

The first dune planting day this year will be held at Hihi on May 29th. This project is a great example of the community being proactive and working together to protect their coast. Planting days will also be held at Baylys Beach, Tauranga Bay and Tapeka among others.

The sunny weather has also meant a busy summer on Northland's beaches which can spell trouble for the dunes, especially with increasing numbers of dirt bikes and 4WDs. However, there has been a definite reduction in vehicles on beaches related incidents, compared to previous years. There is still some way to go though to educate beach users about the potential damage their vehicles can cause to the beach environment, and danger to other beach users, and how they can reduce this. We have held a number of safe beach driving awareness events around the region, with

support from the Department of Conservation, District Councils, the Police and local CoastCare groups.

Speaking of education, work on a new online coastal education programme for Northland is going well. The resource will be active on NRC's website by the beginning of July, 2010. It is designed specifically for Northland schools and their communities, but will be accessible to anyone with an interest in learning more about Northland's coast. Topics covered include beaches, dune systems, estuaries, rocky shores, coastal threats and actions for our coast. Units can be used independently or as part of a comprehensive coastal education programme. The resource will be interactive with opportunities to post information, and links to other relevant websites. A competition will give Northland school children the opportunity to name the resource, and win some prizes for themselves and their school.

Visit our website to download past issues of 'CoastCare News' and various leaflets on beach protection: [www.nrc.govt.nz/coastcare](http://www.nrc.govt.nz/coastcare). Or contact me at [lauras@nrc.govt.nz](mailto:lauras@nrc.govt.nz) or on 0800 002 004.

## Pest and Predator Control at Beaches. Dean Nelson

Dean Nelson gave a presentation on Pest and Predator control at the Timaru DRTNZ Conference. Acknowledging that this is a huge topic, Dean looked at some of the general techniques and issues associated with pest and predator control. His main take home messages were:

- In any restoration project, know your objectives and do the background planning, consultation and research.
- Ask for advice and don't try to reinvent the wheel. There are many very experienced operators around the country who have tried whatever you are trying to achieve before, and have learnt from experience.
- Consider your statutory obligations, including landowner permission, Ministry of Health consent and potentially resource consent for toxins; also Animal Welfare Act requirements for trapping.
- Acknowledge that there is a growing groundswell of public opinion against toxins and to a lesser extent traps, and do things right.
- By doing things well we should avoid making the process more difficult for others in the future in relation to the previous point. Hopefully we can also significantly reduce the issue of toxin or trap-shy animals.
- Pest and predator control can be a very long and expensive process. If we are in it for the long haul, we need dedicated and well motivated staff and/or volunteers.

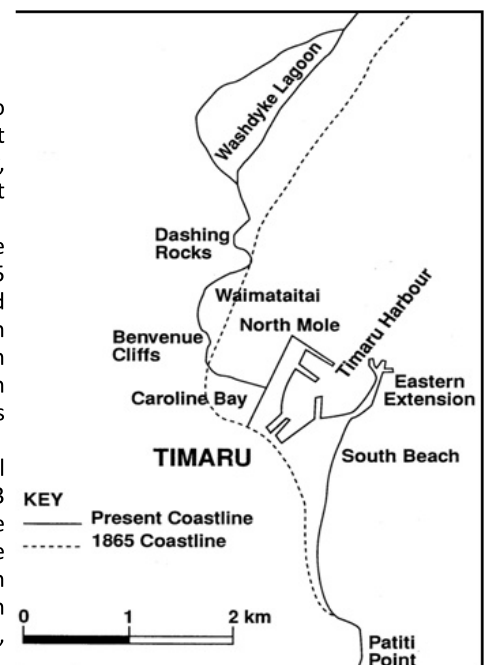
## Science Articles by Members

### Coastal Processes in the Timaru Area. Derek Todd, DTec Consulting (continued over page)

The Timaru coastline has been changing in position and form in response to construction of harbour breakwater structures since 1878. Prior to this the coast around the fledgling township was considerably different from what we see today, being characterised by a gravel beach ridge backed by loess cliffs overlaying ancient volcanic headlands, and lagoons at Waimataitai and Washdyke.

The initial 1878 southern breakwater was 90 m long but had to be rapidly extended due to gravel build up against the wall, with a further 245 m being added by 1884. An 195 m swing to the north in 1887, and the 900 m long eastern extension between 1900 and 1916, gave a total length of 1.3 km from the 1865 shoreline position. The first northern wall was constructed in 1887, a 730 m long structure to prevent sand drifting in from the north-west. A new alignment was completed in 1944, followed by the extension and reclamation of the current north mole in the 1960's to give a total distance of this structure from the former shoreline of 1000 m.

Gravel accumulation has continued on South Beach against the breakwater to now total over 60 hectares of prime industrial land for port related industries. Over 5 million m<sup>3</sup> of fine sand swept past the harbour has accumulated in Caroline Bay to advance the shoreline over 700 m and created over 50 hectares of prime recreational asset. These shoreline gains have been balanced by erosion and loss of coastal lagoons to the north at Waimataitai and Washdyke. To understand these shoreline changes we need an understanding of the processes operating along the whole South Canterbury coast, particularly to the south.



## Coastal Processes in the Timaru Area. Derek Todd, DTec Consulting (continued)

The major source of sediment to the southern coastal budget is from erosion of the Waitaki alluvial outwash fan and from the Waitaki River, which is transported northwards by the dominant south-east wave approach. The Waitaki fan was formed by a series of Pleistocene glaciations, and has been eroded around 50 km at the coastal margin by raising sea levels since the last glaciation around 20,000 years ago to leave an alluvial cliff coastline north and south of the Waitaki River. Erosion is still continuing with historical retreat since 1865 being in the order of 70-100 m on the south side of the river at an average rate of 0.6 m/yr, and 50-80 m at an average rate of 0.4-0.5 m/yr north of the river. This erosion supplies around 69% of the gravel and sand to the coastal budget. The Waitaki River drains a huge upland catchment and is therefore potentially a very significant sediment supplier of coarser gravel and sand to the coastal sediment budget. But the catchment also includes a number of natural lakes formed by glacial processes which trap sediment, and a number of hydro dams, of which the first was the Waitaki Dam in 1935, which trap further sediment preventing it from reaching the coast. This has resulted in much debate on the effect of this sediment trapping on the river supply to the coast and on erosion processes along the coast. In principle any reduction in river supply should result in increased coastal erosion. While this was true for the post-dam period of 1945-1977 when erosion rates increased to around 1 m/yr, erosion rates generally reduced again in the 1977-2000 period, which is not constant with a continuing long-term sign of effect from damming. It is suspected that long-term variability in coastal conditions may be a factor in the results, and it is likely that the dam signal is still to arrive on the coast. The rest of the southern Canterbury coast comprises relatively stable low gravel beach ridge along the Waihao-Makiikihi coast, slowly eroding loess cliffs around St. Andrews, and largely stable loess and basalt embayments immediately south of Timaru; none of which supply much sand or gravel to the coastal budget. Hence the largest supply is concentrated in southern part of the Waitaki Fan.

A dual transport system operates on the mixed sand and gravel beaches in southern Canterbury. Gravels and coarse sands are transported to the beach by swash action, and fine sands are transported in suspension in the nearshore zone. This is important for the post-port coastline configuration at Timaru. Due to the nature of gravel transport - sliding up and down the beach face in the swash zone - and the weakly resistant nature of greywacke gravels, the pebbles and boulders are abraded and transported north in reduced sizes and volumes, with only around 11% of the Waitaki gravel supply reaching Timaru. The gravels arrive at South Beach at an

average rate of 50,000-60,000 m<sup>3</sup>/yr, however this supply is highly variable, being dependent on the frequency of south-east storms to firstly erode the southern cliffs, and secondly to transport the material northwards. The accumulation of this material over the last 130 years has become an important asset for the port, providing flat land for port related industries and activities and a ready source of gravel for reclamations and fill operations. Sediment is still accumulating despite extraction activities. A negative effect of gravel build-up has been its transport along the breakwater and into the shipping channel. This effect has been reduced by the construction of spur groyne in 1987, but still occurs in storm events. While gravel is trapped by breakwaters, the fine sand transported in the nearshore zone bypasses the barrier. Some is deposited in the harbour entrance channel, and subsequently dredged out (around 100,000 m<sup>3</sup>/yr), some continues northward to the inner shelf of the Canterbury Bight, and is transported into the quiet waters of Caroline Bay in the lee of the harbour breakwaters. The fact that Caroline Bay is the only sand beach for around 240 km of coast is entirely due to the construction of the port. Historically, the sand accumulation has occurred at an average rate of around 30,000 m<sup>3</sup>/yr. The shoreline has advanced over 700 m since 1865 and shows no sign of having slowed down as it moves into deeper water in the bay. This accumulation has added significant recreation benefit to Timaru, with Caroline Bay being a well patronised regional summer holiday destination for families and the location of many local attractions and activities. The accumulated sand has also been used in harbour reclamation and other fill operations around the city. Some of the accumulated beach sand has been used recently to create low coastal back dunes as part of the Caroline Bay Development Plan. Starvation of gravels north of the port resulted in a barrier breach across Waimataitai lagoon which rolled back on itself and the lagoon was lost in 1934. By 1938 continued retreat of the shoreline threatened the main trunk railway and resulted in substantial rock protection works. Consequently, the existing shoreline was pushed seaward from its 1938 position in the former southern lagoon, however, continued erosion at the north end of the bay due to high-energy south-easterly and easterly storms has resulted in the extension of rock to protect the addition of houses since 1938. North of the Dashing Rocks headland is 12 km of mixed sand and gravel beach extending to the Opihi River. The coastal hinterland includes: Washdyke lagoon - a regionally significant wetland for migratory birds; highly productive agricultural land; the main industrial estate for Timaru (Washdyke); the city sewer line and

treatment plant; and national transport links (Main Trunk railway and SH1). The hinterland is also very low-lying and prone to coastal flooding, so it has been protected by coastal stopbanks since the 1930's. This area also has a history of rapid erosion, with retreat at Washdyke being in the range of 350-400 m since 1865, and 120 m at Opihi resulting in the loss of large areas of productive hinterland and wetlands, and the expense re-location of coastal stopbanks and sewage outfalls. The accreted erosion is often attributed to the effects of sediment starvation due to the trapping at Timaru Harbour. These effects include a reduction in sediment size due to abrasion, which in turn results in less ability to absorb wave energy. Consequently there are more offshore sediment losses and flatter slopes, which lead to reduced beach ridge heights and therefore more frequent wave overtopping, which displaces more sediment landward therefore further accelerating erosion rates. Investigations in the 1970's concluded that the erosion was most likely to continue resulting in the total loss of the Washdyke Lagoon by the year 2000 as well as erosion threats to the industrial and transport infrastructure assets located behind the lagoon. Accordingly, in the 1980's, the Timaru City Council introduced zoning at Washdyke prohibiting development below the 3 m contour. The city sewer outfall was relocated and investigations into the use of beach renourishment to slow down retreat rates were carried out. In 1987 harbour dredging of up to 100,000 m<sup>3</sup> per annum began to be deposited 1 km offshore at Washdyke in an effort to reduce erosion. However, only around 20% of this material is of sufficient size to be useful on the beach, and transport rates toward the shore are slow. Further investigations in the late 1980's showed that erosion rates since the harbour construction had a constant pattern along the Washdyke-Seadown shore; accelerating from the 1860's to a peak in the in the 1930's to 1950's period, but then reducing from the 1950's to the 1980's. It was considered that these erosion rates could be due to increased sheltering of the shoreline from southerly storms by Dashing Rocks; or that the shoreline had moved closer to an equilibrium position and plan shape with its altered sediment supply, or that there had been large scale variations in the resistance of the hinterland to erosion processes. On-going research suggests that there has been further deceleration of erosion rates since the 1980's. Again it is not certain whether this has been as a result of any of the above natural reasons, or has been influenced by the inshore harbour renourishment over the last 20 years. As a consequence, there remains much uncertainty on future erosion patterns along this section of coast.



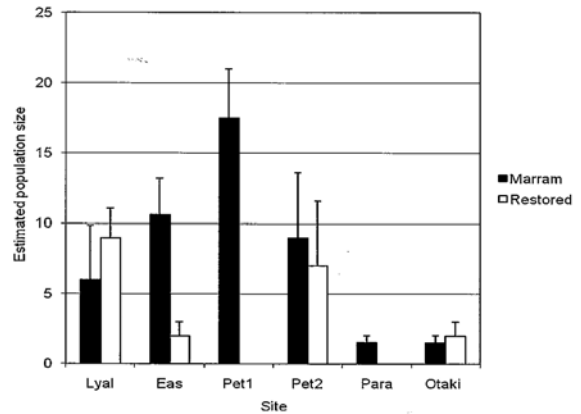
## Dune Ecology. Sam Jamieson, MSc Student, Victoria University

As we all know, sand dunes are critically endangered ecosystems, supporting a wide variety of specialist native flora and fauna. They have declined significantly in the past century, due to coastal development, exotic invasions, and stabilization using marram grass (*Ammophila arenaria*). An increasing number of restoration groups have carried out small scale rehabilitations using native sand-binding plants spinifex (*Spinifex sericeus*) and pingao (*Desmoschoenus spiralis*). However like many other restoration ventures, most efforts are not formally monitored, despite the potential for conservation of species in decline. My thesis research sought to investigate the social and ecological aspects of sand dune restoration in New Zealand.

Firstly, the status of restoration in New Zealand was examined using web-based surveys of dune restoration groups, identifying motivations, methods, and the use of monitoring in the restoration process. Secondly, the ecology of restored and marram dominated sand dunes was assessed. Vegetation surveys were conducted using transects of the width and length of dunes, recording plant composition. Invertebrates were caught using pitfall traps and sweep netting, then identified and counted. Lizards were caught in larger pitfall traps, and tracking tunnels recorded the presence of small mammals in the dunes. Analysis of each variable involved the comparison of biodiversity data between restored and marram-dominated dunes, at six sites across the Wellington region.

The survey of dune restoration practitioners confirmed that restoration was generally based on the motivation of erosion protection and foreshore stabilisation, however an increasing number of groups were interested in the conservation of flora. Conservation of fauna was a priority for only one of the respondents. Informal monitoring of restoration attempts was carried out by the majority of groups, but specific biodiversity monitoring or monitoring using systematic scientific methods was conducted by only a small proportion of groups. Re-vegetation of dunes commonly used a small suite of native sand-binding species mostly pingao and spinifex. Species in decline such as sand tussock (*Austrofestuca littoralis*) and sand daphne (*Pimelia arenaria*) were only planted at a small proportion of sites. Restoration of dune ecosystems has the potential to not only enhance erosion protection and sand stabilization mechanisms, but to benefit native flora and fauna endemic to sand dunes. Identifying biological change and carrying out biodiversity monitoring may be beneficial in understanding and improving the ecological effectiveness of restoration attempts.

Marram dunes contained higher foliage cover, vegetation height and vegetation species diversity than restored dunes. Abundance and diversity of beetle, spider, and ant families were higher in marram dominated dunes. Estimated population size of common skink (*O. nigraplantare polychroma*) and mouse population density was also higher in marram dunes. These results were positively correlated with the percentage of vegetation foliage cover and vegetation species diversity, suggesting that the physical habitat conditions created by marram grass supported, on average, a greater number of animals (both native and introduced species).

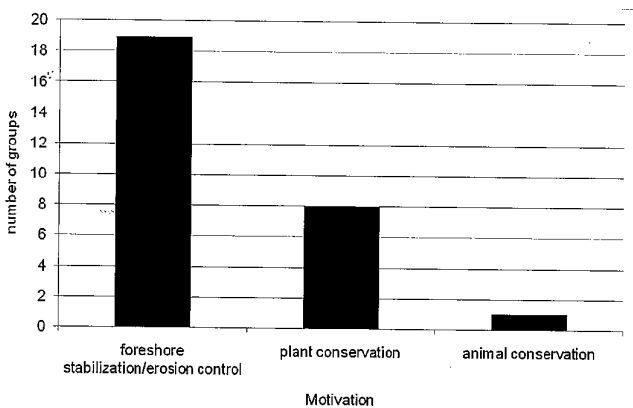


### Recommendations

These results suggest that for maximum biodiversity gains, future dune restoration attempts should increase vegetation cover, and include a wider range of plant species. Species in decline known to be important for fauna, such as pohuehue (*Muehlenbeckia spp.*), sand pimelia (*Pimelia arenaria*), and sand coprosma (*Coprosma acerosa*) should also be included for their reciprocal benefits for conservation of flora and fauna. Mass removal of Marram grass and other vegetation cover may have detrimental consequences for animal populations such as skinks or specialist dune invertebrates, therefore during restoration it is recommended that patches of dense vegetation are retained either side (or within) the restoration area for several years so that fauna have a refuge from which to recolonise the restored dune as it matures. This is particularly important when the dune to be restored is isolated from other dunes or back dunes, as may be the case in more urban sites. No doubt there are some animals which prefer the more sparsely vegetated areas of the fore dune, but we do not know enough at present to define the niche of every dune species.

I am hoping that as a result of my work, there will be more emphasis on the conservation of fauna in dune restoration. Further investigations into the ecology of "natural", disturbed and restored sand dunes is being carried out by staff and students at Victoria, Massey, and Lincoln Universities.

Thanks to the Dunes Trust for your support; to those who completed the survey ; and to Stephen Hartley and Murray Williams my supervisors. Please contact me if you have any questions or comments: jammy.sam@gmail.com. [A pdf of Sam's MSc thesis can be accessed from the Victoria University library website: <http://hdl.handle.net/10063/1229>. Sam recently presented the results of her research to the Entomological Society of New Zealand and to staff at Greater Wellington Regional Council. She recently graduated with first class honours for her Master's degree. For those interested in finding out more about the creepy crawlies in the sand, Stephen Hartley has recommended pg.13 of this publication from the Auckland museum: [http://aucklandmuseum.com/site\\_resources/library/Education/Teachers\\_Guide/Teacher\\_Resources\\_Library/Gallery\\_Activity\\_Sheets/InsectsBN.pdf](http://aucklandmuseum.com/site_resources/library/Education/Teachers_Guide/Teacher_Resources_Library/Gallery_Activity_Sheets/InsectsBN.pdf) ]



# Research Projects Update

## SMF Project - Empowering Coastal Communities to Adapt to Climate Change

This Dunes Trust project partially funded by the Ministry for the Environment's Sustainable Management Fund, is continuing to be extremely successful as we gradually make our way south. The last round of Canterbury-based workshops - New Brighton Beach, Christchurch City and Timaru - were held in February and March prior to the Dunes Trust 2010 conference in Timaru.

The Civil Defence tsunami alert resulting from the earthquake in Chile on 28th February caused a minor setback as it preceded our workshop at New Brighton. Residents and beach-users were advised throughout the morning to stay away from the Christchurch beaches for the day. Fortunately, however, we were given the 'all-clear' to go ahead with the workshop and field trip just prior to the scheduled start. Coincidentally, the workshop included information highlighting the need to restore our sand dunes to mitigate the effects of such events. Despite the tsunami alert, the workshop was well-attended and lively discussion ensued on dune restoration and the effects of a tsunami.

Planning for the next Climate Change workshops is underway as we liaise with local councils and coastal communities in Dunedin and Southland. These workshops will be held in September. Details on dates and locations will be posted to our website - [www.dunestrust.org.nz](http://www.dunestrust.org.nz)

Part of the funding for this project is for the production of a new Technical Handbook for which the first 300 folders and their 10 dividers have been ordered. The first eight articles relevant to the management of dunes in the face of expected impacts of Climate Change have also been produced to the design and layout stage. These are:

- Ecology and management of spinifex (2 articles)
- Impacts and management of vehicles on beaches (2 articles)
- Beach processes and storm erosion (2 articles)
- Use of accessways on coastal dunes
- The role of fencing on sand dunes

Along with the above work the Coastal Reference and Coast Care Group Databases are taking shape with well over 300 entries to date and hundreds of Coast Care Groups identified through regional councils. This information, in a user friendly format, is scheduled to be available on the Dunes Trust website by the end of next year.

## SFF Project - Adapting Productive Coastal Landuse to Climate Change

A 12-month scoping study project by the Dunes Trust partially funded by the Ministry of Agriculture and Forestry's Sustainable Farming Fund and the research funds from the Trust is drawing to an end with the final report due in July 2010. This project has focussed on scoping the issues of sustainable land management along our productive coastline, i.e., the considerable proportion of New Zealand's sandy and estuarine coastline that is immediately adjacent to pastoral farming or exotic forest production landuses.

Over the last year, Project Leader Jim Dahm and David Bergin have been evaluating opportunities to better integrate and sustain both productive land uses and coastal ecology along our critical coastal margins in the face of projected sea level rise and other climate change effects. This has involved both targeted field-based focus group meetings and on-line discussions with farmers and foresters in selected sites in both the North and South Islands. Examples of 'best practice' management are being documented where actual or potential conflict between productive landuse and the restoration of coastal dunelands/estuarine wetlands have, or are being, successfully addressed.

The report, to be completed in July, will identify opportunities for future work required for developing adaptation strategies in the face of Climate Change and for promoting good landuse practice guidelines for our productive coastal lands.



**Rodney Chambers of Christchurch City Council showing attendees at the Climate Change workshop the restoration of foredunes using pingao and spinifex, New Brighton Beach, Christchurch.**  
Photo: Michael Bergin.



**Recent development of the actively accreting foredune at Caroline Bay, Timaru, including large scale planting of dunes species and erection of boardwalks undertaken by the Timaru District Council and the local community.**  
Photo: Michael Bergin

## Dunes Trust Key Contacts

Jody Bond  
Administrator  
[info@dunestrust.org.nz](mailto:info@dunestrust.org.nz)  
Tel. (07) 350 2241  
[www.dunestrust.org.nz](http://www.dunestrust.org.nz)

Mark Dean  
Chairperson  
[Mark@naturalenvironments.co.nz](mailto:Mark@naturalenvironments.co.nz)  
Mob: (021) 949 339

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