Pūkorokoro Miranda News

Journal of the Pūkorokoro Miranda Naturalists' Trust

November 2022 Issue 126

Kaitiaki Rangers

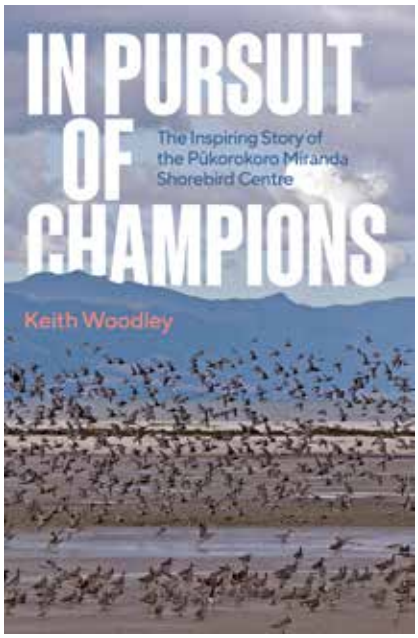
Nature Journaling

Biodiversity

Dotterels

What's on at the Shorebird Centre

November 11-13 Wader Identification Course.
Spend time in the field and in the classroom learning about waders, ID and ecology.



Saturday November 19
1 pm Book Launch.
Join us for the launch of Keith Woodley's new book, ***In pursuit of Champions: the inspiring story of the Pukorokoro Miranda Shorebird Centre.***
Bring your lunch. High tide is at 4 pm so you could go birding following the event. ***RSVP to the Centre if you are attending.***

January 20-26 January 2023
The Field Course.
Topics include anything natural history but with a focus on the local area and shorebirds. This course is currently full but contact the Centre to be on the waiting list.

Cover Photo

Already making their mark at Pūkorokoro, Lead Kaitiaki Ranger Tansy Bliss (right) and Assistant Kaitiaki Ranger Hera Clark (left).

Photo: Keith Woodley.

Help Wanted - The Editor

If you like to be the spider in the web, have a hankering to be a reporter, or love playing with layout then contact Keith at the Centre to talk about how you might be able to help with some or all of the magazine. We need you! - So what does being involved mean?

Like most roles at the Trust the role of the editor is a volunteer role. Putting out an issue of the magazine involves:

Reporting
- Writing up short articles on events and occurrences at the Centre
- Reporting on information about shorebirds and the coastal ecology.
- Writing - taking information made available and turning it into a cohesive article.

Commissioning
- Approaching people who have interesting information and asking them to write articles
- Finding great photos to use alongside articles
- Asking staff and volunteers to provide specific items

Production
- Using Indesign (or a program of your choice) do the layout for the magazine
- Engaging with the printer to print and get the finished product to the Centre.
- Getting a pdf version to the Centre for electronic distribution.

The magazine goes out four times a year and its an amazing way to be involved!

Recent sightings at Pūkorokoro

Arctic Migrants

5200	*Kuaka*	*Bar-tailed Godwit*
1000	*Huahou*	*Red Knot*
1		*Black-tailed Godwit*
37		*Pacific Golden Plover*
2		*Sharp-tailed Sandpipers*
2		*Curlew Sandpiper*
2		*Red-necked Stints*
6		*Turnstone*

NZ Species

240	*Ngutu parore*	*Wrybill*
42	*Kōtuku ngutupapa*	*Royal Spoonbill*
1	*Kōtuku*	*White Heron*
470		*Black-billed Gull*

and the regular contingent of waterfowl!

Editorial

The Trust is in a period of editorial transition. We are grateful to Gillian Vaughan for editing the last three issues of *Pūkorokoro Miranda News*, following the grievous loss of Jim Eagles in 2021. She undertook this role while at the same time agreeing to take on the position of interim Chair, following Will Perry's migration south. Longtime Trust member Koshy Yohannan, who also recently moved to Dunedin, has offered to oversee magazine design and layout. I have been co-ordinating the commissioning of copy. We remain, however, hopeful that a new editor will emerge in the not-too-distant future.

We report here on a hugely significant step-change for the Trust with the appointment of kaitiaki rangers. Tansy and Hera have quickly made their mark around the centre, its grounds and on the Findlay Reserve. Which is just the beginning. Elsewhere in this issue, you will find further evidence that New Zealand Dotterels do not necessarily require pristine, unmodified nesting habitat. Quite the contrary as Bridget Robinson of HEB Construction reports. There is also an account of the comings and goings of Tasman-hopping Banded Dotterels on the Shotover River, and an update on those tagged godwits.

And just in case some of us bird people need reminding we are a Naturalists' Trust, moths and biodiversity round off this issue.

Keith Woodley.

Shorebird Snippets

China

In July PMNT received further recognition for its work in China at the launching ceremony of a new China-New Zealand migratory shorebird cooperation mechanism. The meeting was the latest initiative under the Memorandum of Arrangement between China's National Forestry and Grassland Administration and the Department of Conservation that was signed at Pukorokoro in 2016. Attending the virtual meeting were New Zealand Ambassador to China Claire Fearnley, and senior Chinese government officials, academic researchers, along with DOC deputy Director General Sarah Owen and other DOC staff. Representing the Trust, David Melville presented a summary of our work at Yalu Jiang to date, along with aspirations for future engagement.

There was optimism that renewed focus on bilateral shorebird conservation work will create opportunities to deliver joint conservation actions for the benefit of our migratory shorebirds.

Ambassador Fearnley and her staff continue to take a keen interest in PMNT and our work with migratory shorebirds, and are working with Dandong City on events in November to mark the 50th anniversary of New Zealand diplomatic relations with China.

A date at Government House

As a long-time student of history and politics, it was a splendid opportunity to experience Government House. The palatial grounds and gardens, animated by a Wellington breeze, and draped with morning sun. The extensive imposing building and its interior steeped in history. This was overt in the form of numerous portraits lining the walls. Less obvious were thoughts of what events and conversations these walls had witnessed. Tuesday September 13, and our scheduled hostess is absent. Dame Cindy Kiro is on her way to London following the death of Elizabeth II. Dame Susan Glazebrook, government administrator in her absence, would be presiding. A formal ceremony followed by high tea.

An extraordinary collection of people, activities, and achievements were recognized at the investiture. Medical research and public health, media and film, publishing, agriculture, conservation and community service were all in the room. A humbling experience for me: fitting recognition for PMNT and its people.

Phone line blues

A modest but significant piece of the Centre's infrastructure passed into history recently. Our phone and EftPos terminal are now run on Wi-Fi. This has unshackled us from dependence on the copper phone cable that had become increasingly problematic. Outages, usually after heavy rain had become frequent. Calls to Spark, followed by several days of waiting for it to be fixed, are likewise a thing of the past.

Blackbird blues

There is a male Blackbird resident at the Centre that is an impressively slow learner. He is also quite oblivious to just how *unprotected* he is. Last year he would continually flutter against the doors, presumably to see off the rival he saw lurking there. And to leave deposits of which there seemed an endless supply. This year he has added the door to the new cottage to his patrolling beat. He has also, to the chagrin of numerous visitors, discovered rivals lurking in every wing mirror of any car parked outside. As the owners of the two most commonly present vehicles, Chelsea and I have borne the brunt. Then Tansy joined us and immediately became a victim. But she came up with a simple but seemingly effective solution; putting bags over her mirror. So the bird lives on, for the moment. It still regularly deposits on the deck and doors.

Parawai School

School visits to the centre had become rather infrequent lately. This was a trend before Covid, but the pandemic and its upheavals certainly did not help. But then through August and September that all changed. Michelle Burke, release teacher at Parawai School, Thames, set out to bring the entire school. We now had classes visiting two or three days a week. Chelsea and I, assisted at times by volunteers, alternated duties between Centre and hides. We all agreed it was great to once more experience the energy and bustle of school kids on a visit.

Text and Photos: Keith Woodley

Volunteer Thank You Day

In October we held our first annual Volunteer Thank You Day. We wanted to celebrate the enormous effort that our guides, shop-minders, Council members and gardeners all put in to keep this Trust and Centre running. With our growing visibility online, local visitors, and the return of the international travellers, it is really starting to feel busy here and we wouldn't be able to accomplish it all and provide the experience we want our visitors to have without this team.

25 of us enjoyed lunch and a catch-up together at the centre and most took a walk out to the shellbank at low tide. This is such a sensitive area, and the importance in keeping it a safe roosting area means we don't access it often, but it really was a treat to enjoy it as a group. For many it was the first time out there. The chenier plains are so unique, and their constantly evolving landscape makes every trip a new experience. For those who are regular visitors to the hides it was easy to see how 5,000+ godwits and other species can frustratingly 'dissappear' amoung the ridges.

The day was originally planned to be work-free to just enjoy the area. However, with the new Kaitiaki Ranger positions and capacity for managing the habitat, it was an opportune time to make the most of the extra hands and have a bit of a test-run at removing some weeds. The birds are keeping to the south end of the shellbank where it is wide and clear and by pulling a few weeds just to the north we will see if this extends the area they feel comfortable roosting in. If it works we may look to hold more working bees on the shellbank.

On the walk back as we watched the tide coming closer, pushing the waves of shorebirds ahead of them, we found mussle buoys, tyres, nets, wrecked birds and other detritus along the shore. As can only be expected with this group, everyone carried something back leaving the beach much tidier than we had found it.

A memorable day and I look forward to the next one, hoping I can keep my word next time and make it work-free. Thank you to all our Volunteers!

If you would like to join our fantastic team we have training days coming up on the 27th and 29th of November. Email us admin@shorebirds.org.nz to find out more.

Text and Photos: Chelsea Ralls

Kaitiaki Rangers

The appointment of Tansy Bliss as our lead kaitiaki ranger fulfills a long-held PMNT aspiration.

Since its inception nearly 50 years ago, the Trust has been extremely well served by numerous passionate and talented volunteers. They remain the backbone of the organization and its operations. While, since 1993, the role of manager has been a full time position, supported since 2007 by a part time assistant, it remains essentially a voluntary organization. This has sometimes posed limitations to what we could achieve.

This became increasingly apparent once we purchased the Findlay Reserve in 2016. That event was of momentous significance on several levels. First, the land itself forms an essential part of the high-tide roost system on the Firth of Thames. Its centrepiece is the Stilt Ponds and bird hides, and the Limeworks site. The Lane family had been gradually selling off their farm, but had retained ownership of this coastal block, even though it was no longer a functioning part of their operation. Grazing had ceased several years earlier, and the block had been protected by a QEII covenant since 1993. Now the Trust would have full control, as well as responsibility for restoring and enhancing the area as wildlife habitats. We were now active land managers.

But managing and restoring the reserve is an enormous task. Ray and Ann Buckmaster and their team of volunteer assistants have done a fantastic job of commencing restoration of the reserve. But it is a task that will require considerable resourcing into the future. Having a full-time ranger to coordinate and manage the project is therefore a massive step change. And we are thrilled to have someone of Tansy's experience and expertise.

No less significant is this opportunity to work in partnership with mana whenua Ngāti Paoa. As reported in *PMNews 125*, Tansy has been joined by Hera Clark as part-time kaitiaki ranger. Hera was our shore guide last season and will take up the role again this year. The extra hours, largely funded through grants from the ANZ Staff Foundation and Waikato Regional Council's Environment Initiatives Fund, will effectively give her a full time position until the end of March 2023.

Our successful application to Foundation North's GIFT fund for the kaitiaki ranger role set out three key aims:
- Direct restoration and management of habitats
- Formalise the exchange of information and ideas between Te Āo Māori and conservation science.
- Increasing engagement with the wider community

These two appointments considerably expand the Trust's capacity to achieve those aims.

We are now in a period of transition as our rangers familiarise themselves with the project and the various tasks involved. There will be regular updates in PM News. There will also be new and exciting opportunities for volunteers to assist.

Keith Woodley

Flight paths

The first time I pulled up outside the Miranda Shorebird Centre as it was known then, I was in an unreliable 1980's gold Ford laser. I was shown the Whimbrel Wing and left to my own devices. I was on a 2005 Hot Springs tour with a friend from the South Island and I knew better than to drag him to the Wrybill hide, until after we had had a long soak in the hot pools.

At that stage I had recently become a New Zealand citizen. I had been in the country 5 years and was ready to swear allegiance to the Queen and contribute to New Zealand Society. Employment with the Department of Conservation gave me the opportunity to be directly involved in species management and it suited me perfectly. Previously I had worked for International Aid organisations in Peru, Bolivia and Kenya facilitating local communities to protect their environment and improve their standard of living through projects involving organic agriculture, eco-tourism, guiding and environmental education.

My work with DOC took me the length and breadth of New Zealand stretching from the Haast Ranges in the South, Kaitaia and Raoul Island in the north and out to the Chatham Islands in the East. I had a short spell in Thames and later on Great Mercury Island, both periods instrumental in cementing my relationship with Pūkorokoro Miranda. The focus of my work and personal interests have largely overlapped, allowing me to spend the last 20 years involved in meaningful conservation work in New Zealand, protecting endangered birds and their habitats while at the same time building links with the communities around them.

Arriving back at Pūkorokoro Miranda and taking up the role of Kaitiaki Ranger, feels like the natural continuation of a long and interesting journey. I have not tired of heading down to the hides, binoculars round my neck and telescope slung over my shoulder, knowing there will always be something exciting to share and enjoy.
I look forward to expressing my connection, respect and service to this stretch of coastline. I acknowledge the interwoven layers of human occupation and land use; the swirling masses of migrant waders dropping to roost and feed, and the resilient resident birds attempting to breed in this wave washed environment.

I will be working directly alongside Hera Clark and together with input from Ngāti Paoa, PMNT Council, staff, members and volunteers, we will work to provide appropriate safe and secure places for the birds and people to thrive together.

Tansy Bliss

Young Champions continue to inspire

*The southward migration of godwits continues to fascinate **Adrian Riegen** who has been following their journeys during this year's migration and sharing the stories. Here he looks at highlights of the 2022 southward migration.*

I had hoped to report that all godwits with active transmitters were safely back in New Zealand by now but as usual the godwits have the last say in this matter.

The young godwits, now three years old, carrying satellite transmitters fitted in 2019 continue to inspire an ever-increasing number of people, particularly on the Pūkorokoro Miranda Facebook page. Many of them report being in awe of these remarkable birds and in particular their extraordinary migration flights. Even though I have been following satellite tagged godwits since the heady days of **E7** way back in 2007, I never tire of their story and still find it hard to comprehend a bird flying across, what to us mere mortals appear to be a featureless ocean for up to ten days. To the godwits it is a highway, which many of them must get to know quite well.

The oldest godwit we know of in New Zealand was at least 28 years old when last seen. How many times had that bird traversed the Pacific? I wonder if they recognise islands they pass over year after year. Do birds that stop on any of the hundreds of South Pacific islands learn that these might be good places to stop, if need be, during unfavourable weather, or due to exhaustion on their epic eight-to-ten-day journey from Alaska? So many questions still to be answered, if only to satisfy an inquiring mind. With a rapidly changing climate, understanding how birds cope with changes will be important in helping to protect them and information gleaned from the tagging program may help this process.

As I write this (15 October) three of the remaining young tagged godwits have stopped on Pacific Islands, **4RRBB** on Badu in the Torres Strait, although as her tag hasn't transmitted since 5 October we don't know where she is now. **4RBBR** is on Espiritu Santo in Vanuatu and **4RBWB** is near Honiara in the Solomon Islands. Both seem in no hurry to return to New Zealand just yet. They will be considered adults next year so should knuckle down to doing what is expected of adults, producing the next generation. If the tags keep working, we might see them shift to a new cycle with none of these sightseeing side trips.

With only seven of the original 40 tags still working the chances are getting slimmer of seeing another round trip. **4RBBB** did stop on the west coast of New Caledonia from 11 September to 6 October and then flew directly back to her favoured non-breeding site at Foxton Beach on the Manawatu Estuary. It seems that no matter where these birds stop during their migrations they know where they want to be and when continuing their journey generally set a course directly for that chosen destination. **4RBBY** was a good example of this when she departed from New Guinea on 12 August and set course for northern New Zealand keeping on a pretty direct bearing. She landed on the Manukau Harbour on 20 August, but her favoured site is Matarangi on the Coromandel and the next day she was back there. **4RYRB** has stopped in Aotea Harbour in the Waikato, arriving there on 10 October after an 11,700km flight. Her favoured site is near Nelson in Tasman Bay, so perhaps she will return there soon. **4RYRY** appears to be still in the Northern Territory in the Limmen National Park. The transmissions are from a very small area so there is a possibility the tag is no longer on the bird, so we will just have to wait and see if she chooses to go somewhere else eventually.

Two Adults

Only two of the adult tags are still working, **4BBRW** and **4BWWB** and both are in the Firth of Thames. Both have now shown us three round trip migrations. **4BBRW** set distance records in 2021 and 2022 but no new records this year. However, his three journeys are now immortalised on the latest Pūkorokoro Miranda Tea Towel and just in time as a Christmas stocking filler.

The transmitter that was on the adult **4BBYB** transmitted reliably all summer from its location by the Colville River on Alaska's North Slope. Last year it stopped transmitting on 10 October when presumably the tag was buried in the first snow of the winter. It started transmitting again on 13 May this year when the snow finally melted. It stopped working on 25 September, so did the snow come earlier this year? And when will it start up again? Some of us will be keeping an eye out for these birds on mudflats and shellbanks around New Zealand over the summer. We will be looking forward to following any birds with still active tags on the next northward migration and hopefully learning more about how they cope with changing conditions along the way.

Adrian Riegen

This information is courtesy of an international research project involving: Max Planck Institute for Ornithology, Global Flyway Network, Massey University, East Asian-Australasian Flyway Partnership, Birds Canada, Birds New Zealand, Fudan University, USGS Alaska, and USFWS Migratory Bird Program.

Nature Journaling

*For many years artist, illustrator and author **Sandra Morris** has conducted art courses at Pūkorokoro. Here she reports on the latest Nature Journaling course held on 19-21 August.*

Photos: Sandra Morris

Squeezed between weeks of rain, and delayed by Lockdown, the long-awaited nature journaling workshop this year was held on a fine weekend. We attracted 10 participants, including 3 delightful, talented young people. It was the first time we have included young participants and I was pleased to see how well the dynamics of such a broad age group worked. I am hoping we can continue to attract younger people to these workshops, and to sign them up as future members.

Friday night started off with a shared meal then general introductions and a demonstration from Keith on how to use telescopes down at the shell banks.

Each workshop day started off with an early breakfast then straight into class by 8am!! The first session demonstrated various techniques followed by a walk along nearby trails to collect roadside wildflowers and grasses which gave us plenty to work with in our journals throughout the weekend.

Prior to a trip to draw the birds at the shell banks we practiced our speed drawing using taxidermized specimens from the centre. Exercises in drawing started off with 10 minutes to sketch while looking carefully, then decreasing minute by minute to sketching in 30 seconds. This demonstrated how to observe quickly for important features and make rapid drawings - much like what is needed for drawing birds as they move about feeding on the incoming tide.

A wonderful effort was made by everyone, using telescopes to help draw the birds in the field. I was particularly impressed with the effortless way the young participants coped with this. The wonderful thing about nature journaling is that you don't have to be an ace drawer, but you do need to be an ace observer, so any way you can get your observations down works. It can be diagrammatical or sketchy or more worked up realistically. Or it can be by using words, poems, numbers, graphs etc.

Saturday evening with Robert Hoare and his outdoor moth trap is always a highlight of these workshops. This year we didn't get as many moths, however the evening was saved by the discovery of hundreds of common Bell Frogs chorusing around Widgery Lake near the main building. On getting closer we discovered frogs everywhere - in the grass and around the edge of the lake and amongst the flax leaves. Every frog discovered was a target for the paparazzi - and they posed cooperatively!

Sunday morning the moths were retrieved from the fridge where they had been placed in containers overnight to calm them down so we could draw them without them flapping about. Usually, we get about 2 minutes before they are fully awake, however this time they all cooperated well, and everyone managed to make some good journal studies. After this the moths are released.

Because these workshops are so much fun for me as a teacher, it is always sad to have to say goodbye to everyone at the end. Often new friendships are forged and people go away with the tools to continue a way of personal observation and recording in their individual journals. Some become members and make return visits which is always encouraging.

Special thanks are due to Marie Robinson who did the most wonderful catering of meals: everything ran on time and all dietary requirements were catered for with good cheer.



AUGUST 2022

Miranda Moths



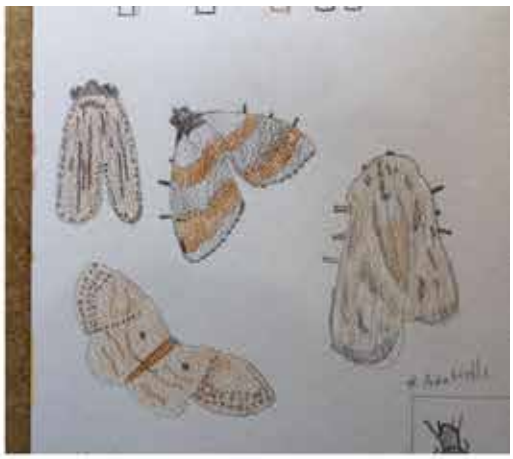
Miranda Moths













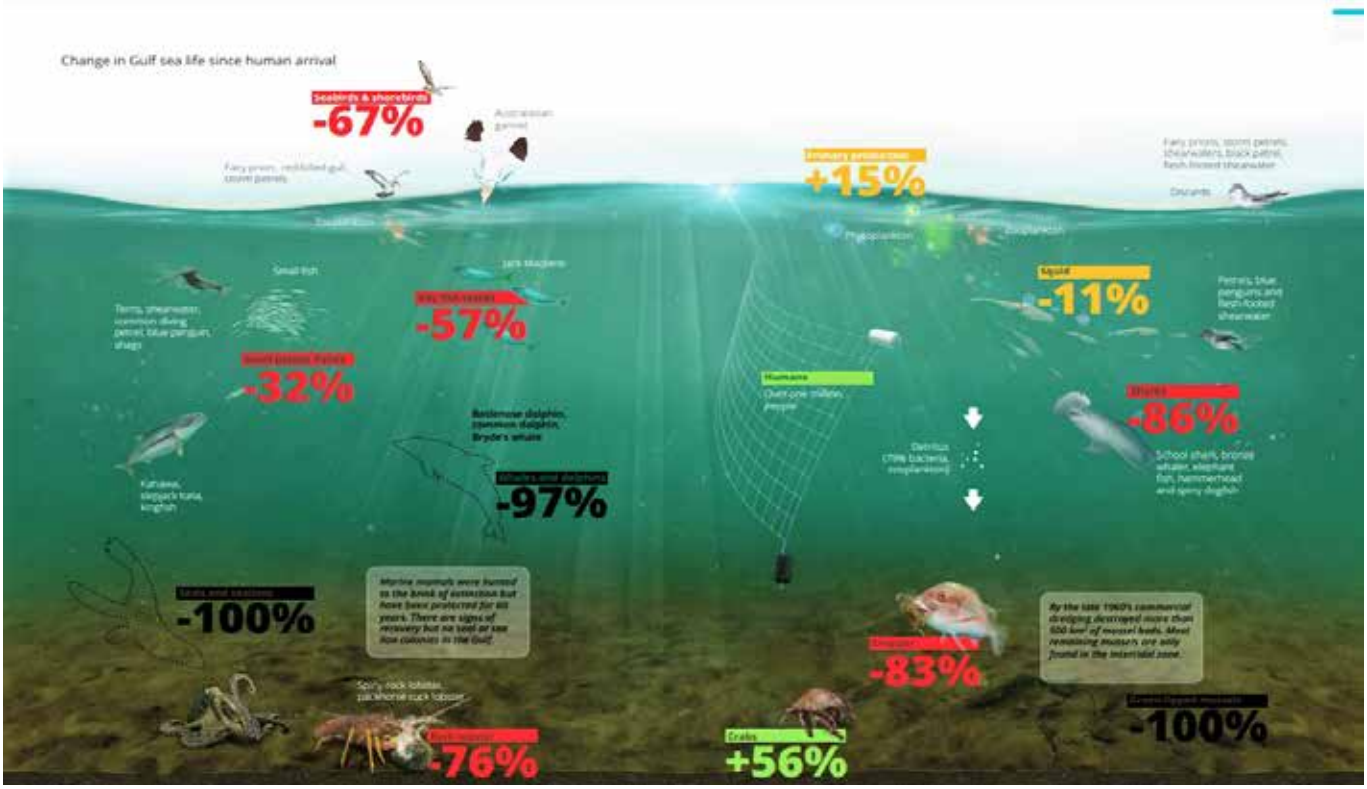




Biodiversity

Between the 3rd and 19th of December the United Nations Biodiversity COP 15 will take place in Montreal, Canada. These, once in a decade Summit meetings, to reverse an alarming loss of biodiversity world-wide, have, so far, met none of the targets set. Delayed by two years and moved from Kunming to Montreal due to COVID 19 there are high hopes that this session will be more effective in delivering a nature positive world by 2030, with a major target being the protection of 30% of both land and sea. As a party to this our Minister of Conservation in April released Te Mana O Te Taiao, The Aotearoa New Zealand Biodiversity Strategy 2020.

Ray Buckmaster looks at how we define and study aspects of biodiversity, the local implications of losing biodiversity and the potential of an innovative approach to reversing our devastating biodiversity loss.



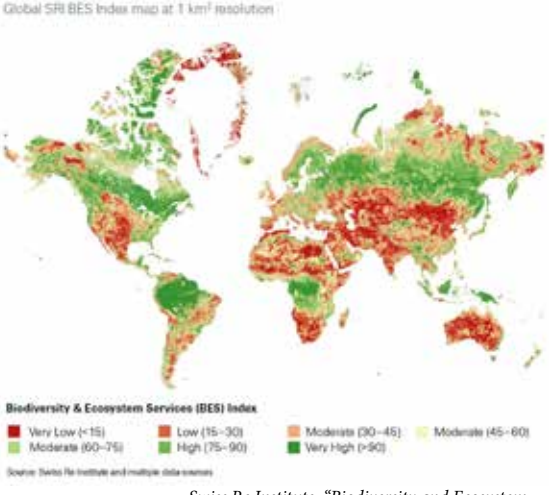
If you were to look for one word that encapsulated the thrust of PMNT endeavours, it would surely be biodiversity. However, you would search for it in vain within our constitution. The Trust was founded in 1975 but the term itself did not appear in print until 1988.

The connection between loss of biodiversity and global warming is often made. The related sea level rise and other human induced changes to the marine and coastal environment and the organisms that live there are a major focus of the Trust's interest. Loss of biodiversity in our own backyard, The Hauraki Gulf, is well illustrated in the 2020 status report from the Hauraki Gulf Forum.

The term biodiversity first came into use however in the quite different environment of the tropical rain forest and it comes with a two-part definition. Most of us would be quite happy defining the plant biodiversity of the jungle just by the number of species there, its species richness, but the other part to be considered is the abundance of each species. Combining those aspects in a sizeable equation produces a single figure, the Biodiversity Index for the plant community. The value of the index is that it can be used to compare ecosystems, and, over time, it can indicate biodiversity trends for a particular ecosystem, be they positive or negative. Practically, it is easier to calculate the Biodiversity Index for smaller components of an ecosystem, perhaps the spiders or a family of moths.

Computational power has increased dramatically in recent years, so it is possible to produce an index by integrating many sets of information. The following index map was produced by combining data on biodiversity on a global scale, and the ecosystem services that the living world provides for humanity. Lots of information converted first to an index value and then to colours on a chart.

A drawback to measuring biodiversity is that gathering the data often needs specialist input from taxonomists and population ecologists. Not so for shorebirds of course. Well informed citizen scientist birders have been gathering census data



Swiss Re Institute, "Biodiversity and Ecosystem Services - A business case for re/insurance"

on species richness and numbers at multiple locations for many years, producing a massive data set!

The bigger picture is, however, that those birds, and we people, are being supported by a much larger biodiversity, most of which we are unaware of or do not completely understand.

There are widely divergent values for the number of species in the world, ranging from 8.7 million to one trillion. Of these only 1.7 million have been formally named by science. If most of the species in the world are un-described and their community impact unknown, estimates of biodiversity could be way off. This is amusingly illustrated by an intensive study of a minor habitat, the belly buttons of American students, which revealed 1400 bacterial species new to science.

Those taxonomists now have a new technique in their toolbox, the powerful gene sequencing technology that we have become aware of since Covid 19 came on the scene.

One technique, known as genetic bar-coding, involves sequencing one gene that all cellular organisms share. This codes for an enzyme called cytochrome c oxidase 1 which is essential for energy production. The gene has undergone regular mutation over the huge timespan of evolution. Excitingly this has resulted in a genetic sequence or bar code that is claimed to differ for each species. All that is needed is a small sample from a plant or animal to produce its barcode.

Currently, over eleven million samples have been bar-coded from just under 800,000 species. Accessing the database, The Barcode of Life or BOLD, is free and the content is growing due to global input. It could include 2,500,000 species by 2026. Most recently, Waikato Regional Council took samples for this purpose from some of the bird collection on display at the Shorebird Centre. BOLD is also a portal which connects to all the data on an identified species.

Multiple bar codes can be detected from a single environmental sample (eDNA), soil, or water, to give a timely and inexpensive measure of species richness in an ecosystem. A virtual eDNA reference hub exists in NZ, and commercial identification of species from eDNA has been available for some time.

Technological advances of this kind are intrinsic to turning the tide of biodiversity loss. The Trust's land restoration effort is just one of many happening around Aotearoa, with a number having developed innovative approaches to their individual biodiversity challenges. We are all heading in the same direction, but, despite this, "national and regional reporting shows our native biodiversity to be under continued threat."

Those last words come from a group advocating a national approach to measuring progress. In 2014 the Government launched the National Science Challenges through MBIE, providing funding of $680 million. The invitation was to our Universities, Government Institutes and Māori organisations, businesses, and other groups to find answers to some of the country's biggest science-based issues and opportunities. In 2020 $3.1 million was made available to guide investment that would have the greatest impact on restoration of native biodiversity. The group, with a diversity of talents, is hosted by Manaaki Whenua Landcare Research under the title, Eco-Index.

The Eco-index team, with input from iwi, the scientific community, government both local and national, landowners and industry produced have developed a long-term vision for biodiversity in Aotearoa New Zealand: "Protected, Restored, Connected 2121":

Protect – Tiaki
Protect Native Ecosystems from threats
Kia haumaru te mauri o te Taiao

Restore – Whakahou
Restore native ecosystems in every catchment to a minimum of 15% of original extent
Kia whakahoki te mauri o te Taiao ki te taumata e hiahia ana e tātau

Connect - Tūhono
Connect native ecosystems from mountains to the sea
Ko te mauri o te Taiao te taukaea hono-hono mai i uta, tae atu ki tai

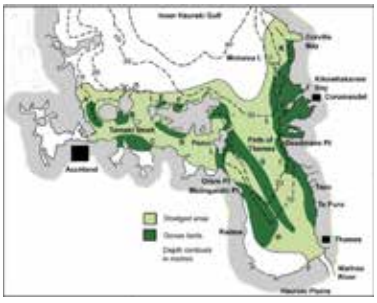
To understand our progress towards this vision, the Eco-index team are gathering and analysing two types of biodiversity indicators:

Biodiversity investment Indicators, such as weed and predator control, native planting, stock exclusion, connectivity development etc: and Biodiversity Impact Indicators such as eBird, Predator Free 2050, other faunal data sets, vegetation maps etc

Analysing and modelling these indicator sets involves computational power and the development of appropriate algorithms to integrate and interpret large numbers of existing but disparate data sets. This is a major part of the challenge.

Impact of the loss of keystone species

Loss of 500,000 hectares of Green-lipped Mussel beds and a similar area of Horse Mussels through dredging, would have had a major impact on biodiversity in the Firth of Thames. Mussel reefs provided both food and shelter for many species while also removing sediment from the water column as a by-product of filtering out their planktonic food. The lack of these ecosystem engineers is witnessed today by the cloudiness of the waters of the Firth. The flow on effect of this sediment load resulted in the loss of large areas of seagrass communities, significant nursery areas for fish, and major sequesters of carbon.



Redrawn by LJ Paul from an original 1969 paper by Reid. The redrawn image appeared in Paul, L. J. (2012) "A history of the Firth of Thames dredge fishery for mussels: use and abuse of a coastal resource", New Zealand Aquatic Environment and Biodiversity Report No. 94.

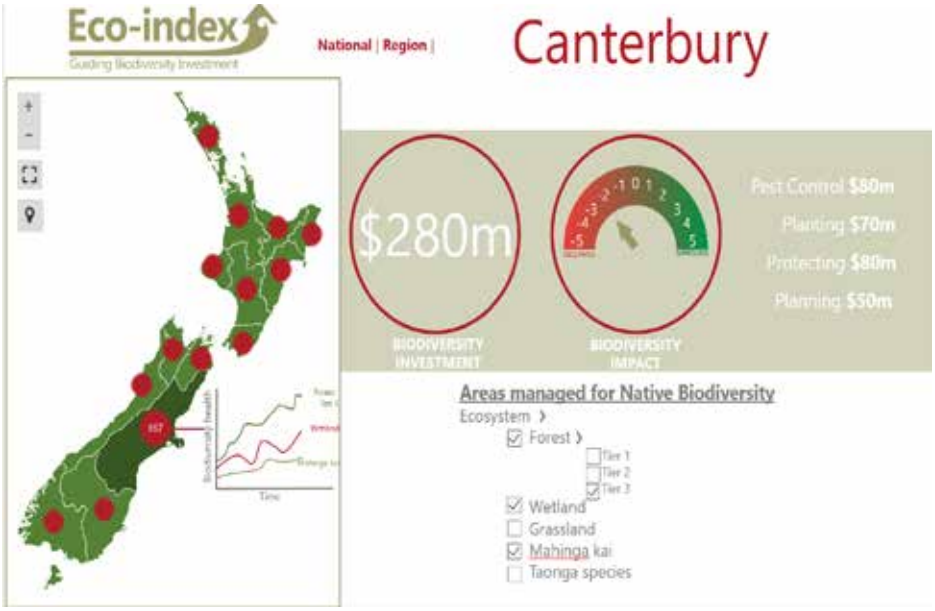
Biodiversity Loss on Land

The impact of the arrival of non-native animal species is well chronicled. In the coastal strip alien plant species also usurp habitat of native plants. Divided sedge and fennel being prime examples.

Ecosystem Services

Ecosystem services are those that the living world provides us. The obvious items are food and other resources, climate regulation, clean water and others that are hard to put a monetary value on, such as kinship with nature with its cultural and mental health significance. Added up the value to us is around one quarter of GDP each year. Biodiversity loss is an indication that our activities are impacting these ecosystem services adversely. All would be fine if we had another 0.6 of an earth, but of course, we do not.
One service that intact coastal wetlands, do offer is carbon sequestration. They are remarkably good as carbon sinks with the ability to store 4 times more carbon per hectare than a forest. Organic materials rot very slowly in salt marshes, due to the exceptionally low amounts of oxygen in their soils. Drain them and oxygen gains access and they become carbon sources.

Salt marshes, mangrove areas and tidal and sub-tidal mudflats, once considered a bit of a waste, all share the ability to sequester copious amounts of carbon. Pleasingly environmental and economic issues are becoming aligned. Six saltmarsh locations around NZ are being evaluated for their ability to sequester carbon and one location is the Pukorokoro Miranda/Kaiaua coastal area. One day they could be producing carbon credits that would finance their continued restoration. Let's not hold our breaths though!



New remote sensing technology is being developed to enrich biodiversity datasets for this work. The Eco-index data scientists are utilising AI and machine learning to "read" high resolution satellite and other imagery.

It is early on in this project, but it should be capable of indicating the annual input of funding needed to turnaround the biodiversity crisis and guide those involved in biodiversity rescue, just where their funding can have the best impact.

The consequences of success could be huge. Its focus is not confined just to the conservation estate but also to productive landscapes. The programme will generate data for ecosystem types and productive landscapes on a national and regional basis which would be available to all stakeholders, be they iwi, foresters, sheep farmers, conservationists etc.

The data can be available to stakeholders in the format like the mock-up "dashboard" above. All going well the position of the arrow on the "fire risk" indicator would, over time, move into the green.

Banded Double Banded Plovers aka Banded Dotterel/Tuturiwhatu (Charadrius bicinctus) of the Lower Shotover River, Otago

Banded Dotterels are unusual in the world of shorebirds in that some of the South Island population migrate to Australia after breeding. Such east-west migrations are rare. Even more unusual is that mid-Tasman they undergo a name change, landing in Australia as Double-banded Plovers. On their return they once again, and rightfully, assume their proper name. After all, they only breed in New Zealand! Dawn Palmer reports on comings and goings of birds on the lower Shotover River, on the outskirts of Queenstown.

Image © Tim Nivan

Since taking an interest in the braided river birds of the Lower Shotover River in the early-1990s, I have kept a loose but increasingly focused eye on the seasonal comings and goings of Pohowera Banded Dotterels.

In 1993, I took part in a survey of the braided river birds organised by the Department of Conservation. During that survey 10 Banded Dotterels were recorded between Big Beach and Kimi Ākau/ Shotover Delta and its confluence with the Kawarau River.

However, it wasn't until 2006 that we, via my colleague Lucy Hardy, started seeing orange flagged Banded Dotterels. On 4 November 2006 while monitoring river birds, Lucy recorded a male 'dot' on Big Beach with an orange flag on its right tibia. This sparked a flurry of excitement and emails between our team, Mala Nesaratnam, Andrew Crossland, and Graeme Taylor and the Australian team (the late Clive Minton and Heather Gibbs of the Australian Wader Studies Group).

Reading the metal stamped bands continues to prove too difficult with the equipment to hand and we were not able to identify individuals, but we learned that the first flagged bird was banded in or near Port Phillip, Victoria, some 2,111 km and roughly 300° WNW of Queenstown. Clive Minton helpfully advised that orange flag combinations have been used from that location since January 1990 and in his email dated 28 November 2006, he reassured us that our sighting was a valuable contribution to shorebird research studies in the East Asian-Australian Flyway.

We had to wait two more years before another orange flagged 'dot' was recorded. This time it was near the head waters of Lake Whakatipu and the confluence of the Routeburn and Dart Rivers on Labour Day weekend in October 2008. The record was provided to DOC by Mary Thompson, and the late Audrey Eagle and Lesley Gowans whose Birds New Zealand Dunedin group were birding in that area. This time the orange flag was reported to be on the left leg (a female).

On 12 October 2019, another male flagged 'dot' was seen in the Tucker Beach Wildlife Management Reserve. This bird was paired up with an unflappable female. We watched this pair sit solidly on their nest established very close to an informal walking track along the beach terrace in the Tucker Beach Wildlife Management Reserve. As chicks grew large and downy the female could be seen gathering her shuffling chicks under her wing. The pair fledged all three chicks.

On 15 October 2020 another male flagged 'dot' was again found in the Tucker Beach Wildlife Management Reserve and this year, we have a PAIR of banded 'double banded' plover in the Reserve.

This season we have an orange flagged pair confirmed in the Reserve by photographer Tim Niven who managed to photograph the male and female together on 17 September 2022. We are yet to find their nest!

This is wonderful to see and very encouraging for generating more local enthusiasm for monitoring and protection of our local braided river bird population. Last December 2021, I was able to organise a team to resurvey the Lower Shotover River, the first survey in 28 years; with the help of the Friends of Tucker Beach Wildlife Management Reserve's Jobs for Nature project crew we recorded 89 Pohowera Banded Dotterel between Big Beach and Kimi Ākau/ Shotover Delta.

Knowledge that our "local" Pohowera population is increasing and that they are so well travelled helps us tell their story, to connect people with the knowledge that these little birds are part of the East Asian Australasian Flyway and a much broader ecosystem than that of the local River. We are looking forward to the 2022/23 breeding season with dots on eggs and the first chicks expected in a few weeks.

Dotterel Courses

It was the end of an era. John Dowding had run Dotterel Management Courses for us almost every year since 2003. Over that time hundreds of people – agency staff and community volunteers – had completed the three-day course. Now they were trained up as dotterel minders, and all over the upper North Island were keeping vigil over the fortunes of those charismatic shorebirds. John had now indicated he wanted to retire from the role, which, after such a long time, was understandable.

As the national authority on the species, we knew he would be hard to replace. Meanwhile, demand for the courses kept growing. In recent years, even before each course began, there would be a waitlist for the next one. Then Covid forced cancellation of the 2020 and 2021 courses. The waitlist was now extensive and growing.

We decided to trial a series of one-day courses. We wanted to gauge whether essential content could be condensed sufficiently, without compromising the effectiveness of the course.

A graduate of an earlier course, Frouk Miller has spent the last six years as dotterel warden on the Coromandel. Her role, under the auspices of DOC, was to coordinate species management in the region, while also looking after her own substantial patch of dotterel real estate on the peninsula. I was delighted to be able to persuade her to be lead tutor for our trial events.

We held four courses over two weeks in August. Each limited to 14 people, all were fully subscribed. Each event was slightly different as we trialed content and delivery, but all proved highly successful. Evaluations completed by participants were universally positive. We now have a successful model that will be used next year. Unsurprisingly, there is already a list of prospective participants.

Keith Woodley

Nesting Dotterels and HEB Construction

Participants at the Dotterel Management courses in August included staff from HEB Construction. One of them was Environmental Manager Bridget Robinson, who here describes their interactions with nesting dotterels.

HEB Construction has a long history of infrastructure projects throughout New Zealand which take place in various urban, suburban, and rural environs. As is the nature of our work, interaction with native species' is inevitable, whether they be marine, freshwater, or terrestrial species. We consider ourselves lucky - and proud - to have the largest, most capable environmental team in the NZ construction industry, with our people working on projects all over New Zealand.

The protection of all native fauna is managed in compliance with legislation, resource consents and Management Plans that are prepared specifically for the site and its inhabitants. Often site establishment and clearance are limited to a very narrow window between breeding and migration seasons for various species to ensure any impact is as minimal as possible.

Pre-construction site assessments and inspections can be undertaken for things like bats, tree nesting birds, lizards, and freshwater species, allowing for relocation, if necessary, prior to works commencing. However, for some ground nesting species, like the New Zealand Dotterel, pre-construction clearance and relocation is not as straightforward.

We have had several interactions on our sites with the New Zealand Dotterel, who have illustrated their dedication to their preferred breeding location and their tenacity to put up with a fair amount of disturbance in the process! Here, we demonstrate some examples of the types of construction sites we have had the New Zealand Dotterel take up residence in, how we have managed them and, in some cases, how we have tried to deter them from nesting for their own protection. As always, this work is undertaken by a dedicated team of environmental professionals whose responsibility it is to ensure no harm comes to the dotterels and that any nesting couples are left to do so uninterrupted…or as uninterrupted as you can get surrounded by construction activity!

Orams Marine

The Oram's Marine project, in downtown Auckland (Figure 1), aimed to expand the existing servicing facilities on site. In November 2020, the Project Manager reached out to the team about the presence of a nesting pair of New Zealand Dotterel in the most inopportune place (Figure 2). Given the nature of the site, in Auckland CBD, near the Silo Park industrial zone, on a small, busy, compacted construction site with little habitat, it was quite a surprise to have the dotterels take up residence.

Figure 1


Figure 2: Dotterel pair, nesting on top of a stockpile, adjacent to haul road

The team recognised that the dotterel's were a protected species and asked for advice on how they could manage them on site. The site was relatively tight, approximately 8,500 m2 with a high volume of traffic and machinery movements. The nest was on a pile of drainage sand stockpiled for future use and held a single egg. The birds seemed relatively indifferent about the workers, though were sometimes curious and followed them around. Interestingly, none feigned injury or tried to lead the team away from the stockpile, as they have been known to do

Thankfully, the stockpile was not in a critical location for construction but was next to a haul road for machinery. Consequently, temporary fencing was erected to prevent workers from getting too close to the birds. The side closest to the haul road could only be fenced approximately five metres away from the nest. This limited how close workers could accidentally get although it was soon well known that the birds were there, and they were left alone. It was not possible to close or move the haul road due to site constraints, but thankfully the dotterels did not seem bothered with the large machines driving past and would happily stay put on their nests. The site team came to work one day to simply find the nest empty and the birds gone. It is not known where they relocated to.

Takanini Stormwater Wetland

This project involved the construction of a 1ha treatment wetland for stormwater control. The works involved a large excavation to shape the pond, with the surrounding area remaining as flat grassy areas that were previously used for keeping horses (Figure 3 and 4).


Figure 3

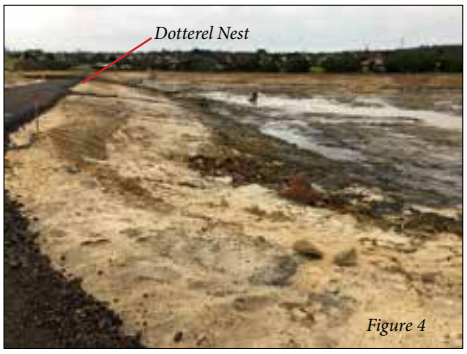


Figure 4

During the summer of 2020, the project was briefly put on hold for two weeks, with no construction activity taking place. At this stage it was a very large, bare clay hole in the ground. When the team returned to site after the two weeks, the base of the pond had become

home to approximately nine breeding pairs of Pied Stilts (figure 5) and a single pair of New Zealand Dotterel (figure 6).


Figure 5


Figure 6

A pair of Spur-winged Plovers had also taken up residence and continued to dive bomb the site crew. The stilt nests were marked out with spray paint for ease of identification.

It took several weeks to figure out where the dotterel nest was located. But we needed to ensure it was properly protected and not at risk of being damaged by workers or machinery moving around the site. To complicate matters further, the nests were at the base of the pond, which was at risk of flooding during rainfall. Various areas were monitored for dotterel activity, including the pond and a large flat grassy area which was used to stockpile the material excavated from the pond. After the stilts had all left and the project had restarted the dotterels were still present on site and carrying out defensive practices and distraction behaviour. This included watching our team from the top of a stockpile and calling to one another and carrying out "injured wing" displays to lure the team away from the nest. This behaviour helped to locate the nest adjacent to the side of the access road on the slope to the pond. As it turned out, they led us to the nest which was home to recently hatched chicks. Now located, the nest area was an exclusion zone with staff told to keep clear of the happy family (figure 6). Eventually the birds and chicks left the site and were not seen again.

Te Ahu a Turanga : Manawatū Tararua Highway Alliance

This project seeks to replace the old Manawatū Gorge Road and includes building a bridge across the Manawatū River and Parahaki Island (Parahaki Island Bridge). Parahaki Island consists partially of gravel accretions, which are considered good banded dotterel nesting habitat and as such our resource consents require us to conduct surveys for dotterels and nests prior to any vehicles or machinery accessing the island during breeding season. If any nest is found, an exclusion zone with a 50m radius must be established until the nest has fledged or failed. So far, no dotterels have been identified within the construction zone. Possible reasons for this include predation and more suitable habitat being available nearby. Cats, possums, and Black-backed Gulls are regularly seen in the area.

However, the regular dotterel surveys are not confined strictly to the construction site. Conducting surveys across the wider area helps to understand the population's behaviour and get a better idea of whether they might decide to nest on site, which allows the construction team to better plan with any risk of nesting. The confluence between the Manawatū River and Pohangina River lies approximately 550m downstream from our site at the western end of Parahaki Island. Extensive gravel accretions are available here and there have been multiple dotterel sightings in the area. Banded Dotterel are regularly seen, with less frequent sightings of Black-fronted Dotterel. In October 2021 a Banded Dotterel nest was found on the Pohangina River floodplains. After a few days, it appeared the nest may have been predated, though it was nice to learn that after chicks have hatched dotterels do a thorough job of hiding the evidence! Hopefully these ones hatched and moved on.

Norther Corridor Improvements Project

In some cases, the best method of protecting the dotterel on site, is to make sure they do not nest in harm's way. Easier said than done! In some areas, works cannot be stopped due to safety, program, or access from the public. To deter nesting, various measures were installed to make nesting areas less attractive. In some cases, vegetation and grass was left to grow long so that the lines of sight for the birds watching for predators were not as good. For similar reasons, fences were installed to break up large flat areas and limit sight lines. Flagging, reflective discs and artificial birds of prey were also used, complete with light up eyes and audible hoots! In one particular area a dog walking day was organised, to allow the dogs to leave scent and to be seen by the birds as potential predators in the area. For the most part these measures were successful, but many of them only for a short time. The birds would often eventually get used to things like birds of prey, flags and reflections and become brave enough to sit right underneath them.

Converse to the above, an attempt was made to make areas that were suitable for nesting more attractive, to allow the birds somewhere else to go. The grass/vegetation was cut short, people and equipment were excluded from the areas and any other sight blocks were removed. This however did not prove to be overly successful, with the dotterels trying to persist with areas they were more familiar with.

The site was successful in deterring dotterels from nesting in the areas that were most important to the project, however, in other areas nests were established and were able to be protected and left to hatch uninterrupted. In these instances, the areas and restrictions were notified to all staff and exclusion zones established. One pair at least was observed to be successful with the chicks being visible. This was in a constructed stormwater wetland in an area of the project that had been recently completed. Others seemed to have eggs and eventually simply left the site.

The Environmental Team at HEB Construction take great pride in being able to participate in the protection and management of such special native species. Educating our wider teams and implementing management techniques are some of the steps we can take to try and help protect, and hopefully encourage success of, the New Zealand Dotterel and Banded Dotterel.

Moths of Miranda monocots: a multitude of miners and munchers

Through regular visits with his light traps during our field courses and Sandra Morris's art courses, ***Robert Hoare*** *of Manaaki Whenua—Landcare Research has been building an inventory of moths found at Pūkorokoro. Here he explains that, with large scale restoration now underway in the area, there may be exciting possibilities ahead for moth enthusiasts.*

Cabbage Tree Looper, showing the delicate lines that camouflage it when it rests on dead leaves of its host. Photo / Olivier Ball.

August in New Zealand is an excellent month to search for moth caterpillars. It is especially good for leaf-miners, those tiny moths whose larvae live entirely inside the leaves of their hostplants leaving characteristic tracks behind as they feed. Unfortunately, August in both 2020 and 2021 brought lockdown restrictions to Auckland, and I, like other eager moth enthusiasts, was confined to my local area.

I started my searches very locally indeed, about three metres from my back door, where a native sedge (*Carex solandri*) growing in a shady spot proved to be full of long pale leaf-mines containing larvae. Amazingly, when the little dark grey moths responsible for the mines hatched out in September, they turned out to belong to a previously unrecognised and unnamed species of the genus *Elachista* (family Elachistidae). Another unnamed *Elachista* turned up in a local park mining in the robust moisture-loving sedge *Carex geminata*.

Since discovering the new moth species in my garden, I have been keen to elucidate more life histories of these poorly known monocot-loving creatures. Monocots are the grass-like flowering plants and include very diverse groups such as grasses, sedges and rushes that can be hard to identify, especially when they are not in flower. The associated insect fauna is often similarly difficult, and therefore tends to be neglected by entomologists. Each year brings more discoveries, and more mysteries to be solved; many of the moth species are unnamed, and there is certainly plenty of scope for new finds!

Such research has practical applications too. Wetlands and open coastal habitats such as those that dominate the Pūkorokoro Miranda coastline are wonderful places for monocot plants, including large and easily identified species such as Cabbage Tree/Ti kouka and Flax/Harakeke. Several key species have been used in the recent restoration plantings in the Robert Findlay Wildlife Reserve, as reported by Jim Eagles in *Miranda News* 117. One of the major aims behind these plantings has been to attract the specialised invertebrates associated with the selected plants, in the hope that these in turn will allow for the establishment of the insectivorous Fernbird in the reserve. Monitoring the invertebrates as they move into the newly planted areas will help measure the overall richness of the restored habitats and the success of the restoration. Here I give a brief overview of some of the moth species known to be associated with these coastal monocots. Several of these moths are not yet known from Pūkorokoro, but they may be lurking undetected, and with time, most of them should turn up.

Cabbage tree/ti kouka (*Cordyline australis*). The Cabbage Tree Looper (*Epiphryne verriculata*) is one of the best-known New Zealand moths, famous for its subtly striped wings that blend so beautifully with the colour and texture of the dead leaves. The larvae make holes in the leaf edges at night and the damage is easily seen. Less well known is the Cabbage Tree Bell Moth (*Catamacta lotinana*), a smaller moth that belongs to the leafroller family Tortricidae. The yellow caterpillar at first mines inside the leaves near their bases, leaving a brownish area, later emerging from the mine, and folding the two edges of the leaf-tip together into a long tube, grazing on the surface of the leaf. It pupates in this fold.

Flax/harakeke (*Phormium tenax*). Notches in the sides of the leaves have been traditionally ascribed to the Flax Notcher Moth (*Ichneutica steropastis*), whose caterpillar will also feed on other large monocots such as Toetoe (*Austroderia spp.*). But it has recently been realised that another closely related moth of the owlet family, *Ichneutica arotis*, also feeds on Flax, so the damage could be made by either species. Both are medium-sized moths: *I. steropastis* is a rich red-brown colour, while *I. arotis* is a subtler straw-brown shade. Both are fairly common. The Flax Window-maker (*Orthoclydon praefectata*) is a moth of the looper family, whose caterpillars leave characteristic transparent patches in the leaves. The adult is a lovely broad-winged moth, usually glossy white with subtle grey crosslines on the wings, though a brown-suffused form occurs in higher rainfall areas. (See under Giant

Batrachedra arenosella (sensu lato) moth. This is the adult of the scale insect predator, larva shown opposite. Photo / Robert Hoare.

Flax Window-maker. The silky white adult is less often seen than the larval damage on flax. Photo / Olivier Ball.

Umbrella-Sedge below for a further moth species associated with flax.)

Oioi (*Apodasmia similis*). It is of great interest that two unnamed micro-moths are associated with this common coastal plant. One of them is a tiny nondescript greyish micro-moth with narrow wings: it is currently placed in the European genus *Megacraspedus* (Gelechiidae) but not really belonging there. The larvae feed in the seedheads. They fly gently around Oioi clumps at dusk but are otherwise hardly ever seen. The second is a species of *Bactra* (Tortricidae), which has only been found on a couple of occasions, at Pollen Island and Kakamatua Inlet in west Auckland. The caterpillar of this elusive moth possibly feeds in the stems. While neither of these moths has been found at Pūkorokoro so far, they may well occur. Surprisingly, another unnamed reddish-brown *Bactra* species has occurred at Pūkorokoro: this species is known to mine in stems of *Empodisma robustum* (a close relative of Oioi) in the Waikato peatlands (e.g., Kopuatai Peat Dome). It is thought to be a wanderer to Pūkorokoro, since the hostplant does not occur there. (All three of these moths were overlooked by the insect collectors of the 19th and early 20th centuries, and describing new species is a more complicated affair these days, so they are still on the waiting list for a scientific name.)

Knobby Club-rush (*Ficinia nodosa*). Larvae of a further, yet again unnamed, species of *Elachista* (Elachistidae) were discovered making mines in the stems of *Ficinia* at Whatipu and Karekare in the last few years. This neat-looking steel-grey species is a giant compared to most of its *Elachista* relatives, with a wingspan of up to 15 mm. It occurs in spring and has never been looked for beyond the west Auckland coast, so could easily turn up at Pūkorokoro. Though related and similar-looking moths mine in *Ficinia nodosa* in Australia, this species is not the same and is almost certainly a formerly overlooked New Zealand endemic.

Giant Umbrella-sedge (*Cyperus ustulatus*). With *Cyperus*, we move into the realms of an unsolved taxonomic conundrum. Francis Walker (1809-1874), who worked at the Natural History Museum in London, described many moth species sent to him from New Zealand by early collectors such as Lt. Col. D. Bolton, Dr Andrew Sinclair, and Rev. J.F. Churton. In 1864, he named the tiny *Gracillaria arenosella* from 3 specimens collected by Bolton in the Auckland region; he described them as 'pale cinereous fawn-colour'. Walker was not very accurate in his taxonomy and this species was long ago transferred to the unrelated genus *Batrachedra*. The problem is that two very similar-looking *Batrachedra* species occur around Auckland with quite different life histories; both match Walker's description of *B. arenosella*. One has caterpillars feeding in the seedheads of umbrella-sedge; the caterpillars of the other are predators of scale insects that live on the underside of Flax leaves, a very unusual life history for a moth! Usually, the solution to this problem would be to examine Bolton's original specimens in London and compare them very closely with reared specimens of the two different species now recognised, to see which is the true *B. arenosella*. However, those original specimens seem to have been lost, so the mystery endures.

The 'monocot moths' are only just beginning to reveal their secrets, and many discoveries surely remain to be made. Not far away, in the Waikato peatlands, an *Elachista* larva has been found mining in the stems of *Machaerina teretifolia* in October. It has never been reared, and quite possibly represents a species that no-one has ever seen as an adult. It will be fascinating to see what turns up in the newly restored areas at Pūkorokoro as the plants establish.

Unnamed gelechiid moth ('Megacraspedus' sp.) whose larvae feed on oioi seeds. Photo / Robert Hoare.

Unnamed Bactra moth, probably a wanderer to Pukorokoro from the Waikato peatlands. Photo / Robert Hoare.

Larva of Batrachedra moth caught in the act of eating a Flax Scale Insect. Photo / Robert Hoare.

GODWIT TIMES

with Emma Salmon

Tēnā koutou

Welcome back to the Godwit Times!

It's time for me to say Ngā Hararei koa, Happy Holidays or Yco at kooteek oolxéis' (as they say in Alaska where I had my chicks).

Here's a challenge for all you Godfrey groovers: I've put together an awesome scavenger hunt! Everything in it can be found at Pūkorokoro on the mudflats. No worries if you're not going to be near us this summer. just keep an eye out over the holidays and see how many things YOU can tick off. Give it a go e hoa ☺

Don't forget if you have been on any birding adventures or have a cool story/artwork about birds, just send Godfrey an email godfreygodwit@shorebirds.org.nz ☺

See you at Pūkorokoro!

Ngā mihi,
Godfrey

Godfrey's Scavenger Hunt

◯ Bar-tailed godwit 	◯ Mud crab 	◯ Royal Spoonbill 
◯ Cockles 	◯ Pacific Golden Plover 	◯ Ruddy Turnstone 
◯ Red Knot 	◯ New Zealand Dotterel 	◯ Sarcocornia 

Pūkorokoro Miranda Naturalists' Trust

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Magazine

Pūkorokoro Miranda Naturalists' Trust publishes *Pūkorokoro Miranda News* four times a year, in print and digital editions, to keep members in touch and provide news of events at the Shorebird Centre, the Hauraki Gulf and the East Asian-Australasian Flyway. No material may be reproduced without permission.

Editorial team (temporary): Koshy Yohannan and Keith Woodley

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See the birds

Situated on the Firth of Thames between Kaiaua and the Miranda Hot Pools, the Pūkorokoro Miranda Shorebird Centre provides a base for birders right where the birds are. The best time to see the birds is two to three hours either side of high tide, especially around new and full moons. The Pūkorokoro Miranda high tide is 30 minutes before the Auckland (Waitematā) tide. Drop in to investigate, or come and stay a night or two.

Budget accommodation

The Shorebird Centre has bunkrooms for hire and two self-contained units: Bunks cost $20 per night for members and $35 for non-members.
Self-contained units are $90 for members and $135 for non-members.
For further information contact the Shorebird Centre.

Become a member

Membership of the Trust costs $50 a year for individuals, $60 for families and $75 for those living overseas.

As well as supporting the work of the Trust, members get four issues of *PMNT News* a year, discounts on accommodation, invitations to events and the opportunity to join in decision making through the annual meeting.

You can join at the Centre, pay via our webpage (www.shorebirds.org.nz), by direct credit to bank account 02-0290-0056853-00 or call the Centre with your credit card details. Contact admin@shorebirds.org.nz for further information.

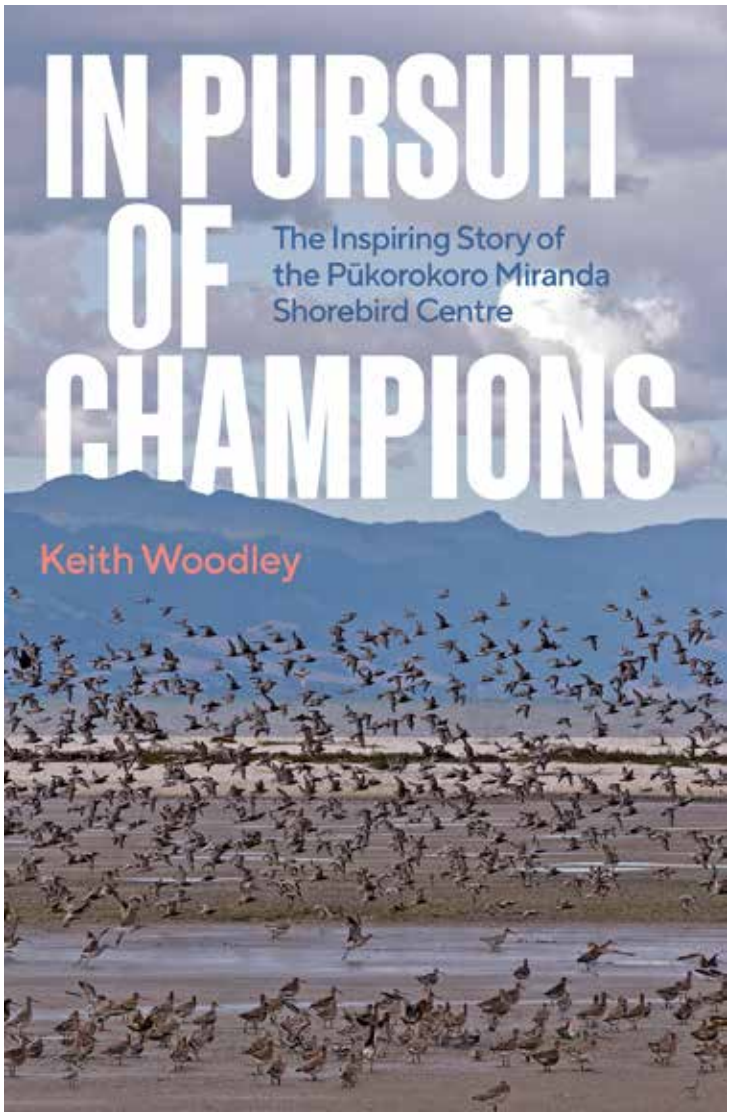
Bequests

Remember the Pūkorokoro Miranda Naturalists' Trust in your will and assist its vital work for migratory shorebirds. For further information contact the Shorebird Centre.

Become a Volunteer

There's always a need for volunteers to do a variety of jobs including helping in the shop, guiding school groups, meeting visitors at the hide, working in the Centre garden, joining in the restoration project at the Findlay Reserve, helping with the Shorebird Census and lots more. If you're interested chat with the team at the Centre to see what will best suit you.

Purchases made at both the Online and Centre Bookshops go to support the valuable work of PMNT

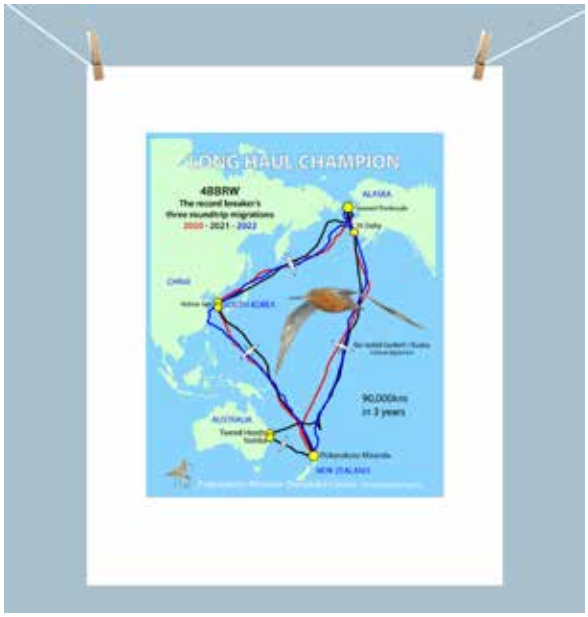


In Pursuit of Champions

Keith Woodley $40

Book Launch
19th November 1 pm
PMNT Centre
Details on Page 2.

Online sales available mid-November.



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