Tītī Times

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Rakiura Tītī Islands
ADMINISTERING BODY

Manaaki Whenua
Landcare Research

NIWA
Taihoro Nukurangi

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Te Whare Wānanga o Tāmaki Makaurau
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Kā tangi te Tītī.
Kā tangi te Kākā.
Kā tangi hoki ahau.
Tihei Mauriora.

The Tītī is calling.
The Kākā is calling,
and I wish to call.
Behold for there is life.

Contents

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LAYOUT: Cissy Pan

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Kupu whakataki / Foreword

The Rakiura Tītī Islands Administering Body (RTIAB) is delighted to welcome the opportunity to start another series of the *Tītī Times*. The past *Tītī Times* was developed as a tool for Rakiura Māori and their whānau, and for others to participate and learn from the previous Tītī research, known as Kia Mau Te Tītī Mō Āke Tonu Atu (Keep the Tītī Forever).

For Rakiura Māori, the future starts by revisiting our past and the previous research and reconnecting with each other. Then we can enter this exciting new phase of research. It will be known as *Te Weu o te Kaitiaki* (Indigenous Regeneration Pathways) with the aim of ensuring the Tītī remain forever.

The RTIAB welcomes the researchers from Manaaki Whenua – Landcare Research, Rakiura Māori, University of Canterbury, University of Auckland, NIWA, and independent consultants who will support Rakiura Māori and their whānau, and the Tītī, with co-designed research objectives.

The *Tītī Times* will again offer Rakiura Māori the opportunity to contribute and reconnect with their unique and nationally important Tītī and Tītī Islands whanaunga, tikanga and kaitiakitanga. By supporting this new phase of research, Rakiura Māori are exercising rangatiratanga over their islands, which contributes to upholding their mana as kaitiaki for Tītī and the Rakiura Tītī Islands for future generations.

Ko mātou te Tītī, Ko te Tītī ko mātou. (We are the Tītī, The Tītī are us).

No reira.
Nā,

Tāne Davis. MNZM.
Chairman
Rakiura Titi Islands Administering Body

Image above: The waharoa outside Te Takutai o te Tītī Marae depicts Kewa and the resources of the surrounding environment, such as Tītī, Pakohe and Tuna. It also references our older taonga, Te Tauihu, at Ka One Roa (Long Sands - Masons Bay), and the Kākā caller from Rarotoka [Down South Whakairo – Steve Solomon].

A new research programme: Te Weu o te Kaitiaki – Indigenous Regeneration Pathways

Since 2017, the Rakiura Tītī Islands Administering Body and Rakiura Tītī Committee have been working with researchers from Manaaki Whenua Landcare Research, Ecosystem Consultants Ltd, and David Fletcher Consulting to finalise and publish tītī population models from the previous research programme [Kia Mau Te Tītī Mō Ake Tonu Atu - Keep the Tītī Forever].

Another goal of this work was to start building towards another study to test how the impacts of management action by kaitiaki (e.g., reduction in weka numbers on islands; removal of taupata) and economic activities cascade through ecosystems and our human communities. We call the programme Te Weu o te Kaitiaki – Indigenous Regeneration Pathways.

Te Weu o te Kaitiaki works on the te ao Māori principle that everything is connected. Led by kaitiaki, we propose solutions that simultaneously restore ecological systems, reconnect people to place, reinforce cultural identity, enhance individual and community wellbeing, and deliver sustainable economic growth for communities.

A key part of the programme is support for training and development initiatives for taiohi and the kaitiaki of the future. In October 2021, a 5-year Endeavour Fund Grant to conduct this research was approved by the Ministry of Business, Innovation and Employment [C09X2104].

The articles in this issue of *Tītī Times* represent a few of the different projects developed with Rakiura Māori over the past 18-24 months. We will highlight the other key projects in the programme in Issue 24.

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Focusing on values to maximise impact

The values we hold have a strong influence on our attitudes and behaviour. Our values strongly influence our political, social, economic, cultural, and environmental preferences. These values can be inwardly focused, such as wealth, comfort, and influence, or outwardly focused, such as concern for others or a desire to protect the environment for its intrinsic importance.

Values underpin everything we do to do or not do. The importance of values grows in significance as decisions become increasingly complex. We don't need to think about our values when choosing a loaf of bread, but when it comes to big decisions with long-term consequences, digging into our individual and group values can be very helpful. The most complex challenges we face require the most significant attention to values.

A good understanding of the birding community's values can help everyone predict the likely success of any action.

Jane Kitson

Luke Moss holds a tutukiwi on Putauhinu.

Likewise, it also allows for the development or refinement of a practice or strategy to match the values of those affected to ensure the greatest chance of success. When a course of action aligns strongly with our value preferences, we are more motivated to strive to make it happen.

The number of core values people can hold is relatively small compared to other concepts such as beliefs, attitudes, preferences etc. Therefore, values provide an economically efficient instrument for understanding a situation. Values are culturally shared, and most people hold to a similar set of values to differing degrees. However, different individuals prioritise various values differently. When faced with trade-offs between their values, individuals or groups will base their choice on the values they consider the most important to act on, resulting in different preferences for different people in the same situation or different preferences for the same person in different situations.

Last year we piloted a method with RTIAB members, known as a choice experiment, to explore their values and how these values can help build clarity and focus on governance decisions. The pilot experiment went well, and the method served its purpose in facilitating a discussion around future pathways and preferences and narrowing the group's focus down to a tighter set of core challenges to address. In the following research stage, we will further refine this method to ensure that it delivers practical and highly effective insights to help RTIAB develop sustainability strategies and actions that have substantial long-term benefits for the community.

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What is causing the number of tītī to decline?

Tītī departing Putauhinu.

In earlier research we used a computer model to compare the impacts of climate, fisheries bycatch, weka and harvesting on tītī numbers between 1976 and 2005. The model was useful because it meant we could do "virtual experiments" to predict what the population would have done in the absence of climate effects, fisheries bycatch, predation by weka, or harvesting. This tells us which impacts we have to measure and reduce, in order to make sure the birds remain plentiful.

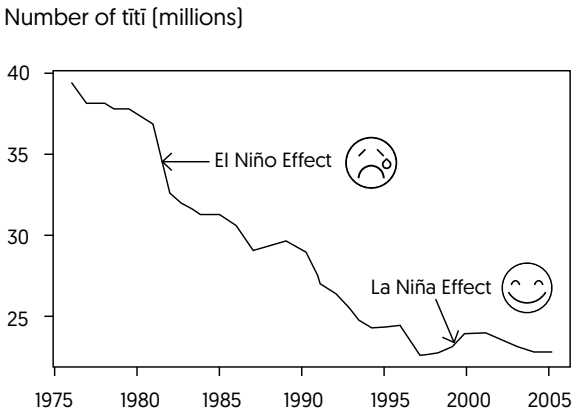
Banding, hole counts and diary records all showed that the number of birds fell by about 1.9% per year. Our model showed that by far the biggest effect between 1976 and 2005 was the impact of climate on adult birds, and that without this there would have been no decline at all. There is no way to describe the declines we see in the diary records other than through adult mortality. An adult bird is far more important to the future health and trajectories of the population than a chick, as many chicks will die before they can start to breed. We estimate that an adult is worth about the same to the population as six eggs or four chicks.

The model predicts that more adults will die in the year before an El Niño, whereas the year before a La Niña seems to be good for them. We may not see lots of dead adults in the year before an El Niño simply because they have a huge migration route, and could have died anywhere in the Pacific Ocean.

The picture below shows our best estimate of the number of tītī in Aotearoa from 1976 to 2005. The biggest drop is 12%, between 1981 and 1982, one year before a very strong El Niño. There are also small recoveries of up to 3% in the year before a La Niña.

Our "virtual experiments" showed that harvesting had a much smaller effect than climate. There was still a decline of 1.4% if only harvesting was removed, with similar effects for removing only fisheries bycatch or predation by weka.

Unfortunately, there is a fair bit of uncertainty around these figures, so we would like to improve the model. There is a lot more information available now than in 2005, so we expect the model will be a better guide for the kaitiakitanga if it is updated.



Reference

Separating the effects of climate, bycatch, predation and harvesting on tītī (*Ardenna grisea*) population dynamics in New Zealand: A model-based assessment. 2020. PloS One, 15(12), e0243794.

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Karen Ward

Taking stock of the tītī population

Research by Rakiura Māori with the University of Otago between 1994 and 2005 indicated that the long-term trend for the Rakiura tītī population was a decline of around 2% per annum, with periodic "knock-downs", when more adult tītī die than usual, prior to an El Niño. There was also evidence of a reduction in breeding rate in the year of an El Niño event, but this has a less dramatic effect on the population. The population appears to grow again once there is a return to more favourable La Niña conditions.

Almost two decades on from that research, we wish to understand the current state of the tītī population, and how accurate were the projections from the population modelling.

The key questions for Rakiura Māori are as follows: Will the tītī still be plentiful enough for your mokopuna? Has rat eradication from some islands helped reverse the declines enough? Or is weka removal from some islands, or even a reduction in harvest needed? And most importantly, is the climate changing in a way to put even more pressure on the birds?

So, for this renewed study we propose to measure tītī burrow-entrance density and annual breeding success on the different islands. We will revise the existing tītī population model and determine which of the various climate change models best explain the trend in tītī abundance since 2005. We will also link to the ENSO (El Niño Southern Oscillation) project to understand how a warming trend in the climate is expected to influence ENSO conditions, which in turn are expected to influence tītī populations.

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Taupata:
a game-changing invasive plant?

Taupata (Fig. 1) is a small native coastal tree that naturally grows north of Marlborough. However, it is commonly grown in gardens throughout New Zealand, and has found its way onto all the Former Crown and Beneficial Tītī Islands to the north-east of Oban, and onto one Tītī Island off the south-western coast of Rakiura. Birder observations suggest that taupata eventually replaces tētēaweka and tūpare, and that burrow stability under taupata is compromised. Taupata therefore represents a significant threat to the ecosystems on the Tītī Islands and potentially their ability to support tītī.

We visited the four Former Crown Islands to the north-east of Oban in 2022, along with the invaluable Tina Nixon as our kaitiaki, to begin to understand where taupata likes to invade and why it is so successful. The extent of invasion across these islands varies from a few individual plants on Pukeokaoka and Motunui, to partial invasion where normal vegetation still dominates but taupata plants and seedlings are frequent (Haumaiteraki), to substantial invasion where taupata is now the dominant plant species (Little Piko; Fig. 2).

Fig. 1. *Taupata is similar to glossy karamū, but has even shinier leaves that are more rounded at the tips.*

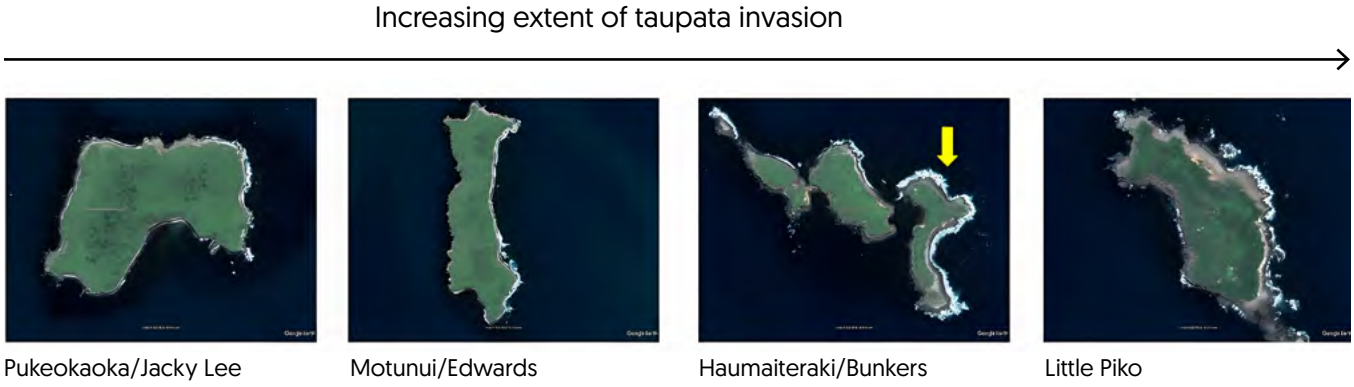

Fig. 2. *Extent of taupata invasion across the four Former Crown Islands, north-east of Oban. Note we only visited the most eastern islet of Haumaiteraki.*

Our initial assessment of these islands suggests that taupata can invade and replace all coastal vegetation (e.g. tētēaweka, kōkōmuka and matipou communities), but has more difficulty invading areas with dense, taller forest (e.g. rātā forest). Taupata invasion of islands dominated by coastal vegetation is rapid – in the past 45 years taupata has gone from being present on the north-eastern corner of Little Piko (7.5 ha) to being the dominant plant species (Fig. 3). Although invasion on the eastern islet of Haumaiteraki is less advanced, we would expect it to be in a similar situation to Little Piko within the next ~10 years due to the number of taupata seedlings across the islet.

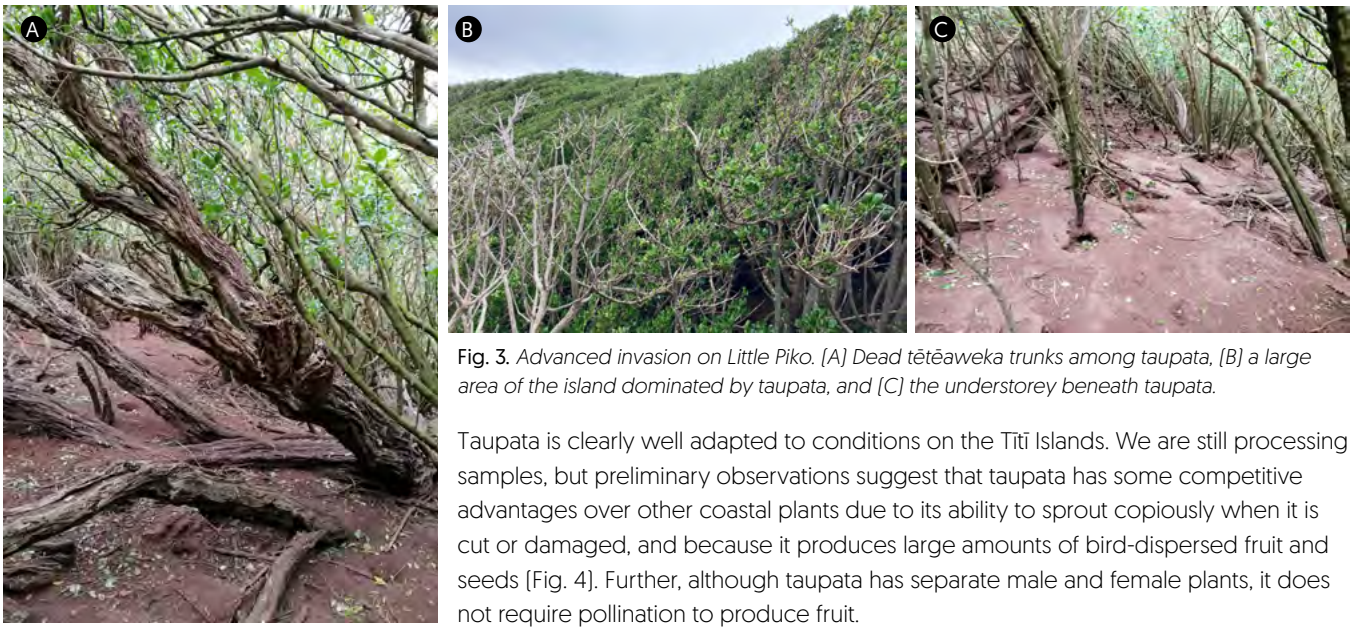

Fig. 3. *Advanced invasion on Little Piko. [A] Dead tētēaweka trunks among taupata, [B] a large area of the island dominated by taupata, and [C] the understorey beneath taupata.*

Taupata is clearly well adapted to conditions on the Tītī Islands. We are still processing samples, but preliminary observations suggest that taupata has some competitive advantages over other coastal plants due to its ability to sprout copiously when it is cut or damaged, and because it produces large amounts of bird-dispersed fruit and seeds (Fig. 4). Further, although taupata has separate male and female plants, it does not require pollination to produce fruit.

seahare123

Fig. 4. *The tendency of taupata to sprout copiously when cut or damaged [A] can result in a tangled canopy [B] that is difficult for tītī to navigate. Taupata also produces copious amounts of fruit and seeds [C].*

Managing taupata is a complex problem. There is a substantial seed source from plants growing around Motupōhue/Bluff and a smaller one from some plants near Ackers Point on Rakiura. Where taupata dominates a large area, its removal carries substantial and difficult-to-predict risks. Amongst these are potential loss of soil, damage to burrows and birds during removal, and that large canopy gaps may provide an opportunity for several other plants that are not normally found on the islands, but that have been introduced around Oban, to invade (e.g. kūmarahou, rangiora). Removal will also require the targeted use of powerful herbicides.

Over the next 3-4 years we hope to conduct some research to help inform taupata management - see "Delving into the complex problem of taupata management.

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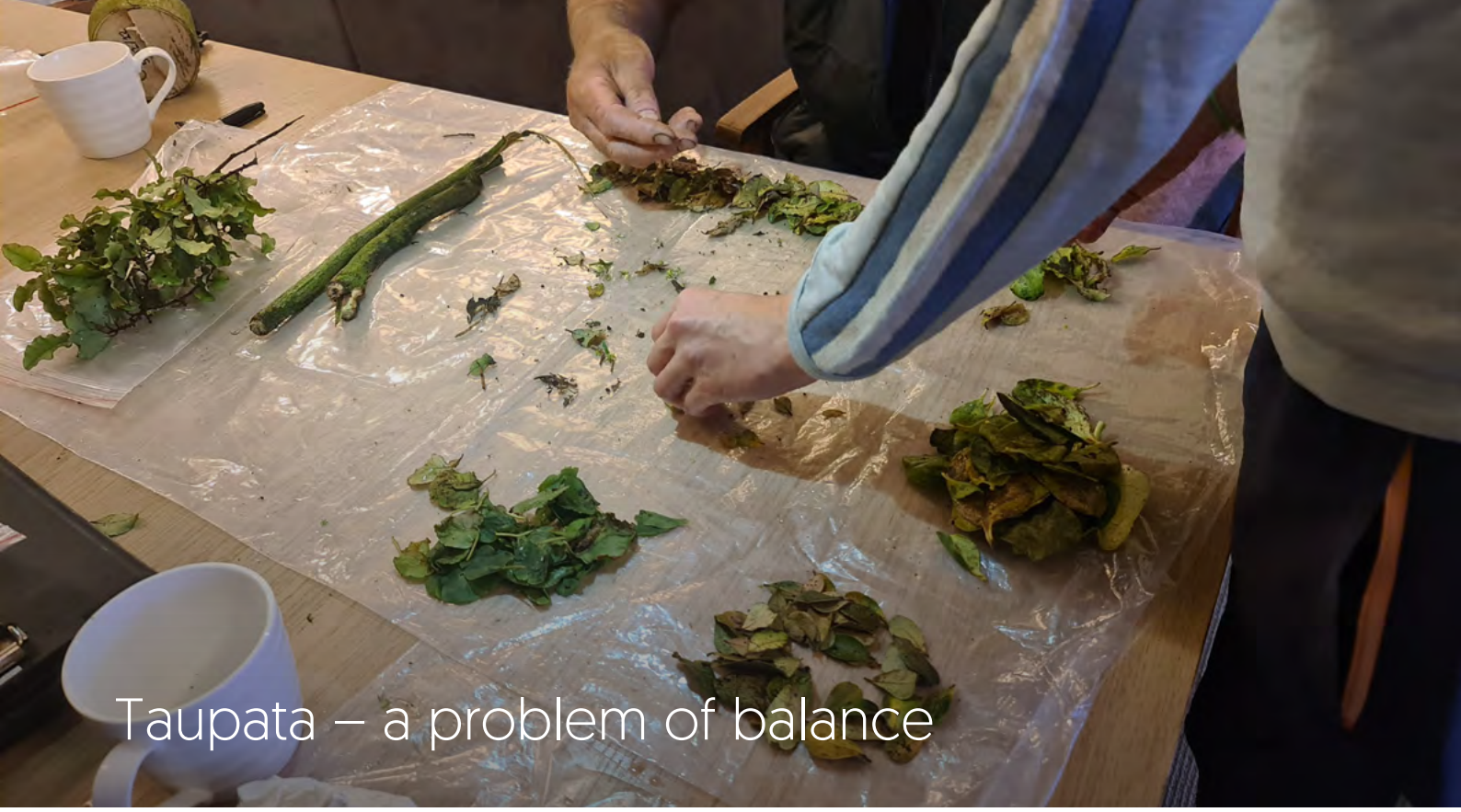

Taupata – a problem of balance

My new heroes wear the best merino tee shirts, "Where is Wally" striped leggings, carry 15 kg packs, leap out of helicopters onto slippery rocks, climb up vertical cliffs like goats and eat lots of nuts and dried fruit.

One of the things I dislike about the crazy world we live in, is how we treat people of little substance, like "influencers", with god-like status but the people who really make our world tick, like scientists, get no such billing.

Spending a week in the company of some of New Zealand's top botanists from Manaaki Whenua was a revelation. Kate Orwin, Morgan Coleman, Chris Morse and Sarah Richardson are simply heroes of our land.

Our mission was to look at what was happening to our Titi Islands and in particular the impact of taupata.

Our problem is that things are out of balance.

A plain looking native tree from the mainland, the taupata, (*Coprosma repens*) has found its way to our islands and its taking over. A simple case of a good tree in the wrong place.

Muttonbird burrows are mostly held together by the fine capillary-like roots of muttonbird trees, tupari and tētēaweka.

The taupata has no such root system and it soaks up all the moisture, leaving the ground with the consistency of cocoa powder. Burrows get exposed easily, and it is too hard to walk through the scrub. Footfall creates trenches as the soil collapses inward like an avalanche.

It a heart-wrenching scene and we need to know if and what we can do to protect the delicate balance of our motu, - which are not just important to us as Rakiura Māori but to the rest of New Zealand as havens for endangered and threatened species.

Our task was to begin what will be a comprehensive programme to look at the impacts this tree is having, and look at the best ways to mitigate its impacts or if possible, and that's a big if, eradicate it without upsetting that balance.

Our first island, known widely as Little Piko, is probably the worst affected.

We landed easily on a helicopter pad cut discretely into the bush above the two muttonbird huts.

The day started at 7.30 am and we finished at 6.30 pm. There was a full chopper load of gear to carry around including emergency canisters if we got stranded due to bad weather.

It's tough, tough work and done against the growing sadness you feel as the enormity of the problem seeps into your tired bones.

The scientists set out randomised plots, which means we had to go off the tracks and into the tangle of taupata and scrub. Crawling on hands and knees sometimes meant it took up to 2 hours to get 300 m.

Each plot took us about an hour to complete as the team took light readings and listed all of the species, taking green leaves, leaf litter, soil and wood back to the lab to analyse.

I was the humble scribe, taking counts of burrows, ticking off the big list of things needed for the scientists to analyse.

Lunch was a treasured time to chat about stuff and the scientists were as keen to hear of my experiences as a birder

as I was keen to soak up the encyclopaedic knowledge they have of our flora.

Each night, at the house we stayed at in Oban, the scientists continued their work well into the night – cataloguing samples and storing them for their trip back to the lab.

We laughed a lot as a team and the only real bummer for me was feeling the viper sting of onga onga, a native nettle that grows huge on some islands. Its toxin stays with you for 4 days and then it just itches. It was much more painful than a wasp sting.

While I just wanted to napalm it, the botanists were fascinated at how big it grew. We all wondered if the toxin had some useful properties. I found it funny how the scientists loved and respected my onga onga enemy. Their passion for plants means I now look at plants in a different light and I see better how things are, or are not, in balance.

My joy was watching all the species of birds flit around us as we disturbed the ground and left them tasty morsels in our wake.

Tieke came close, kakariki stayed well away but ever watching, and the brown creepers ranted at us like a Friday night session of locals in the South Seas Hotel discussing politics.

This project is about keeping the balance and giving our taonga species, and our titi the best chance of long-term survival.

I can't think of a time in recent years where I felt so challenged, so at peace, so included and respected.

The scientists were extremely conscious of tikanga Rakiura Māori and humbled me with the respect they gave it.

There will be opportunities for other Rakiura Māori to do what I did and help. It would be best if you were a little bit fitter than I was but it will be very fulfilling and rewarding work and we will pay those involved as well.

In the 5 days we surveyed four islands. And we have a baseline now for the 5-year science programme we have ahead of us as kaitiaki of our islands.

Be rest-assured these islands are not just important to us but also to Aotearoa as they house some of our treasured taonga species. It's vital work that needs to be done for our whenua and our whanau, and it feels good to be part of it.

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Taupata: a highly disruptive invasive native plant on the Tītī Islands

Taupata (Fig. 1) has invaded all the Former Crown and Beneficial Tītī Islands that lie to the north-east of Oban, and is also present on one Former Crown Island in the south-western group. Taupata can outcompete tētēaweka, tūpare, matipou and kōkōmuka communities, and on small, low-elevation islands can become the dominant plant species within ~50-60 years.

As well as substantially changing the plant communities on individual islands, areas dominated by taupata appear to have lower burrow stability, potentially making it more difficult to harvest tītī.

Our over-arching research objective is to increase the knowledge base used by birders to make decisions on taupata management. Our proposed research covers three areas: 1) identifying where taupata preferentially invades and why it is so successful, 2) understanding the impacts of taupata invasion on biodiversity (including tītī) and island ecosystems, and 3) investigating management options for taupata and the short-term (~3 year) impacts of taupata removal.

Combined, this research could be used to help inform monitoring programmes, raise awareness of the impact of taupata and the risks associated with its invasion on the Tītī Islands, and increase the chances of successful restoration if taupata is removed.

We plan to hold a hui in winter 2023 with interested families to share experiences of taupata, understand aspirations and acceptable management options, and to refine research questions.

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Fig. 1. *Taupata as a seedling (foreground, with very shiny leaves) (A), shrub (B) and small tree (C).*

How do weka affect the ecosystems of the Tītī Islands?

Weka were introduced to some of the Rakiura Tītī Islands around a century ago as a source of kai, feathers and oil, and for rat control. Although weka are a natural part of Aotearoa's ecosystems, the bountiful food available on the Tītī Islands means they can reach high densities.

Research carried out in the early 2000s estimated that weka on Taukihepa (Big South Cape) preyed on around 12% of tītī nests, but the effect they may have on other plants and animals has not been studied. Weka eat a lot of fruit, so they may move seeds around each island and help with forest regeneration. They also eat weta, lizards, and birds, so may lower their populations.

For this study, we aim to understand the influence of weka on the ecosystems of the Tītī Islands, which will give Rakiura Māori more information to make informed decisions about the future management of weka on these islands. We propose measuring tītī nesting success, lizards, and insects across islands with and without weka. We will also collect poo from weka and other different animals to assess their diets, which will show how all the species are connected with each other in a food web.

After carrying out this initial baseline survey, we will suppress weka numbers on several islands for two years, and then assess how this changes food webs, tītī nesting success, and the numbers of lizards and invertebrates.

This research would involve visiting islands briefly (4-days per island) in December and March across three years, as well as a trip in September for two years to suppress weka on a smaller subset of islands.

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