

HIHI CONSERVATION

2021



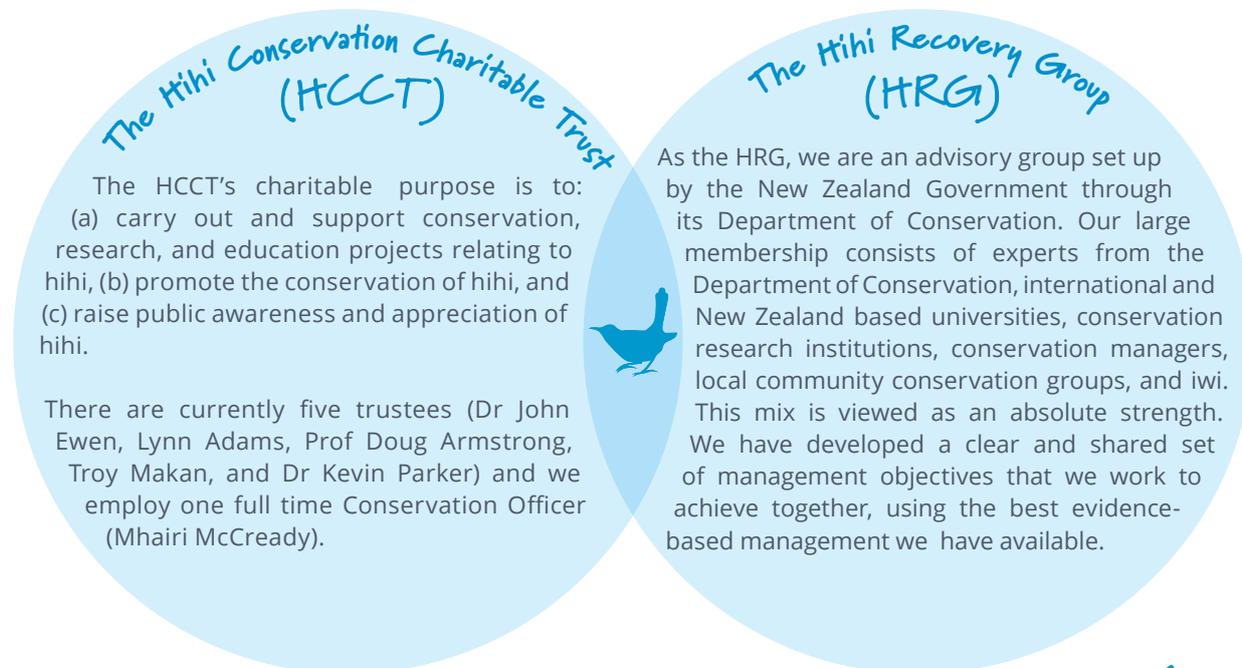
www.hihiconservation.com



HIHI RECOVERY

Who's Who

We are a bunch of people that are passionate about hihi and tasked with guiding their recovery. To do this most effectively, we are structured around two groupings:



The HCCT's charitable purpose is to: (a) carry out and support conservation, research, and education projects relating to hihi, (b) promote the conservation of hihi, and (c) raise public awareness and appreciation of hihi.

There are currently five trustees (Dr John Ewen, Lynn Adams, Prof Doug Armstrong, Troy Makan, and Dr Kevin Parker) and we employ one full time Conservation Officer (Mhairi McCready).

As the HRG, we are an advisory group set up by the New Zealand Government through its Department of Conservation. Our large membership consists of experts from the Department of Conservation, international and New Zealand based universities, conservation research institutions, conservation managers, local community conservation groups, and iwi. This mix is viewed as an absolute strength. We have developed a clear and shared set of management objectives that we work to achieve together, using the best evidence-based management we have available.

The relationship between the HCCT and HRG?

Both groups are centered around a shared mission: hihi recovery. HCCT's mission is designed to fully support the national management objectives outlined by the Hih Recovery Group. As a registered charity, the HCCT can seek funds to help achieve these goals.

Hih Recovery Group Members

CHAIRS

Lynn Adams
Department of Conservation

Dr John Ewen
Zoological Society of London

MEMBERS

Auckland Council:
Bruce Harrison
Matt Maitland

Auckland U. of Technology:
Dr John Perrott

Bushy Park Trust:
Mandy Brooke

Department of Conservation:
Neil Anderson
Lee Barry
Jane Haxton
Troy Makan
Dr Kate McInnes

Hih Conservation Charitable Trust:
Mhairi McCready

Massey University:
Prof Doug Armstrong
Dr Liz Parlato

Ngāti Manuhiri

Parker Conservation Ltd:
Dr Kevin Parker

Rotokare Scenic Reserve Trust:
Fiona Gordon

Sanctuary Mountain Maungatautari:
Dr Janelle Ward

Shakespear Open Sanctuary Society:
Maree Johnston

Supporters of Tiritiri Matangi:
Morag Fordham
John Stewart

University of Auckland:
Laura Duntch (*Student*)
Dr Anna Santure

University of Helsinki:
Dr Rose Thorogood

Waikato Regional Council:
Dr Kate Richardson

ZEALANDIA:
Rachel Selwyn
Dr Danielle Shanahan

Zoological Society of London:
Dr Caitlin Andrews
Dr Patricia Brekke
Dr Victoria Franks
Ashleigh Marshall (*Student*)
Fay Morland (*Student*)

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OUR OBJECTIVES



Increase the total number of hibi nationwide

We aim to increase the number of hibi populations across New Zealand and the total number of hibi in them.



Increase the natural ecological setting of the hibi

Nest boxes and sugar water are provided to help hibi survive and reproduce, but we want more natural sites without the need for these.



Reduce the cost of managing hibi populations

Managing hibi bears many financial costs which we want to minimise. Two major expenses are the provision of nest boxes and sugar water.



Increase awareness and appreciation of hibi

We wish to raise the awareness and appreciation of hibi by local residents and visitors to New Zealand. This charismatic and striking bird is little known or understood, which is something we are working hard to change.

Special Thanks To Our Sponsors

NATIONAL



BUSHY PARK TARAPURUHI



TIRITIRI MATANGI



ROTOKARE



DOC Wildlife Institutions Relief Fund

SHAKESPEAR OPEN SANCTUARY



ZEALANDIA



Help Save the Hibi!

Interested in sponsoring hibi recovery? To find out more about the Hibi Conservation Charitable Trust, visit www.hihiconservation.com or email mhairi@hihiconservation.com

THE HIHI

He manu ririki te Hīhī e noho kau ana i ngā ngahere o Niu Tīreni. I tēnei wā tonu, ka whakarōputia te manu Hīhī he manu mate haere ki tō te rautaki 'Threat of Extinction' o Te Papa Atawhai.

I mua i te taenga mai o tauīwi mā, ka rere whānuitia te Hīhī ki Te Ika a Māui whānui me ōna moutere. Heoi, i te paunga o te rautau tekau mā iwa, ka noho motuhake aua manu rā ki Te Hauturu-o-Toi. Nō te taenga mai o ngā kararehe tauhou, o te mate manu, me te muru kohanga, ka mate haere te Hīhī.

Mai rā anō ko te Hīhī he manu kaikai miere (te whānau manu o 'Meliphagidae'), he whanaunga pātata ki te komako me te tui. Ahakoa tonu, he tūhuratanga anō tā te aronui 'Phylogenetic', he manu motuhake te Hīhī, ā, he tātai anō tōna ki tōna ake whānau, arā ko te 'Notiomystidae'.

He rerekētanga motuhake tōna, arā, ka mahi ai te Hīhī kanohi ki te kanohi. He rerehua te tame o tēnei tū manu, he pango, he kowhai tea, he mā ōna tae. Kāore i te pērā te uha o tēnei manu, ka mau i a ia te kākāhu parauri, me ōna neko mā kei ōna parirau.

I te tau 1980, ka timata te mahi atawhai mō te Hīhī, nā wai nā wai, atu i Te Hauturu-o-Toi, e whitu ngā wāhi whakamarumarū anō hei kāinga mō te Hīhī. Nā te mahi atawhai, ka nui haere te maha o ngā Hīhī, ahakoa tonu, he manu mate ā-moa tonu. Ko ngā kararehe kaikai manu, ko te mate manu, ko te korenga o te ira whakaurutau, me te rāweke kāinga ngā āhuatanga e whakararu ana i te orangatonutanga o te Hīhī.

The hihi is a small (30 – 40g) forest dwelling passerine endemic to New Zealand. At present the species is classified as nationally vulnerable under the Department of Conservation's 'Threat of Extinction' system.

Pre-European times, the species was distributed throughout the North Island and its offshore islands. However, by the end of the 19th century the only population that remained was that on Te Hauturu-o-Toi. The disappearance of the hihi was most likely due to introduced predators, habitat loss and disease.

The hihi was long considered to be a honeyeater (family Meliphagidae) closely related to korimako and tūi. Phylogenetic analysis, however, has revealed that it is taxonomically distinct from this lineage and has been subsequently placed as the sole member of its own family, the Notiomystidae.

The species is also behaviourally unique, being the only bird known to copulate face to face. The males are one of New Zealand's most strikingly coloured birds with black, bright yellow, and white plumage. Females are a less conspicuous brown colour but also have bold white wing bars.

Management of the species began in 1980 and there are now seven reintroduced populations spread across northern New Zealand in addition to the remnant population on Te Hauturu-o-Toi. Under intensive management the hihi has been steadily increasing in numbers but is still at risk of extinction. Introduced predators, disease, the loss of genetic diversity and environmental disturbances continue to pose a risk to the long-term viability of the species.

FUN FACT

The bright yellow of a male hihi's plumage comes from carotenoids, pigments he obtains by eating colourful fruits.



A Brief History of Hihi Conservation

1980

The first ever translocation of hihi brings birds from Te Hauturu-o-Toi to Taranga (Hen Island). The population sadly fails but inspires the beginning of an important conservation strategy for the species.

1991

The Kapiti Island hihi population is established with birds from Te Hauturu-o-Toi and remains to this day the oldest reintroduced population.

1995

A population is established on Tiritiri Matangi Island, which becomes a very successful population and a source for many future translocations.

2005

Hihi are reintroduced to ZEALANDIA in Wellington with birds from Tiritiri Matangi.



CURRENT POPULATIONS

Since 1980, translocation has been used to grow our hihi populations. Prior to the first translocation, Te Hauturu-o-Toi (Little Barrier Island Nature Reserve) had the only hihi population left despite the species having once been found throughout northern New Zealand. Birds were originally translocated from Te Hauturu-o-Toi, but after a population on Tiritiri Matangi Island was established, this became the primary source for many translocations, sometimes with a mix of birds from other sites for genetic reasons. As of 2021, seven reintroduced populations exist throughout New Zealand, with the newest (Shakespear Open Sanctuary) established just last year! All reintroduced populations are actively managed

through non-native predator control, supplementary feeding, provision of nest boxes, management of parasites, and population monitoring. The success of the conservation strategies employed by the recovery group can best be seen by the steady increase in both the estimated population sizes and the growing number of hihi populations. Population sizes are estimates of adult numbers derived from a state-of-the-art integrated population model combining resighting and breeding data (Parlato et al. 2021).

Te Hauturu-o-Toi

Population: 1000 - 3000

Tiritiri Matangi Island

Population: 193

Shakespear Open Sanctuary

Population: 18

Sanctuary Mountain Maungatautari

Population: 104

Rotokare Scenic Reserve

Population: 56

Bushy Park Tarapurui

Population: 46

Kapiti Island

Population: 107

ZEALANDIA

Population: 120

2009

Hihi are reintroduced to the Waikato region at Sanctuary Mountain Maungatautari.

2013

Hihi are reintroduced to the Whanganui region at Bushy Park Tarapurui.

2017

Hihi are reintroduced to the Taranaki region at Rotokare Scenic Reserve.

2019

The total number of hihi in reintroduced populations surpasses 600 for the first time.

2020

The latest population of hihi is established at Shakespear Open Sanctuary with a translocation of 40 birds from Tiritiri Matangi.



HIHI NEWS

Hihi in the Headlines

Media attention is a crucial part of raising awareness about hihi. Despite this year's news being dominated by the ongoing Covid-19 crisis, hihi still managed to snag some headlines and claim their place in the spotlight. These stories highlight the ongoing progress made in hihi conservation, celebrate the people and places that provide a safe haven for these birds, and shed light on some of the scientific findings made about this incredible species.



First Annual Hihi Science Event Draws Global Audience

For decades, hihi conservation has drawn the interest and involvement of researchers from around the world. Their work in the field, lab, and office generates important knowledge about hihi behaviour, ecology, genetics, and conservation. Much of this data goes on to inform strategic decision-making for the species, but it also provides exciting new fodder for public outreach, helping us generate enthusiasm and appreciation for hihi. But how do we get the word out?

Typically, knowledge spreads from the scientific literature to the public via news stories, conferences, blogs, and social media. But this year, we decided to try something new. Inspired by the popularity of online programming during the pandemic, the Hihi Conservation Charitable Trust hosted the first ever Hihi Science Evening on 10 September 2020. Eleven early-career researchers representing ten institutions around the globe took to Zoom to share their knowledge of hihi with the world. And that's no exaggeration! The two-hour event was attended by 191 viewers tuning in from New Zealand (70%) and 11 other countries – all there to satisfy their curiosity about this amazing endemic bird.



Presentations tackled an array of questions reflecting the diversity of hihi research, including:

- *Does reintroducing hihi improve pollination?*
- *Why do so many hihi eggs fail to hatch?*
- *How do feeders shape the social lives of juvenile hihi?*
- *How can we protect hihi chicks from nest mites?*

Overall, the event received rave reviews from attendees, reminding us that hihi are captivating not only to those who study them but to people everywhere. The public wants to keep learning about hihi, and we plan to deliver with our second annual Hihi Science Evening in September 2021.

For More Hihi Science:

- * *Stream the 2020 Hihi Science Evening talks at www.tinyurl.com/hihiyoutube*
- * *Follow @hihinews on Twitter for science updates and details for our 2021 Hihi Science Evening*
- * *Read more Research Highlights on Page 25 of this report*

Honouring a Hihi Hero

Our hihi community has suffered a tragic loss with the passing of Simon Collins (25/2/1973 – 20/3/2021). Simon was a clever, cheeky, and driven character who was Sanctuary Manager for Rotokare Scenic Reserve and the key person who got hihi to the site in 2017. In his words, “ultimately, the vision is to have the sanctuary 'spewing' out wildlife naturally to the surrounding environment.”



Perhaps the hihi are listening: the population currently contains 56 adults, and it produced 36 fledglings this season (Page 13). This is an incredible outcome for such a young population, topping 50 adults more quickly than even our top-performing population on Tiritiri Matangi Island.



We may not wish for hihi to venture outside the fence on their own, but perhaps the site will soon be producing hihi that could be translocated elsewhere. We are sure this would make Simon proud. He truly believed in the Rotokare project and he was passionate about bringing hihi back to Taranaki after a 130-year absence. He was on the money on both counts. Beyond his own corner of the hihi world, he was a strong advocate for our national approach and helped shape what we do. He gave his opinions plainly and with good humour. He fought hard for his passions and for those who shared them. He was a true hihi hero – one we will all miss, and one who will continue to inspire what we do.

DOC Support Shapes Evolution of Hihi Recovery Programme

New Zealand's Department of Conservation has always been a valued partner in hihi conservation, supplying key support for site management and species recovery decision-making. Alongside these contributions, DOC has also provided guidance at many critical junctures in the hihi recovery programme's evolution. Most recently, we reached one of these points in 2019 when we established the Hihi Conservation Charitable Trust.

HCCT's founding mission was to expand our capacity to carry out conservation, research, outreach, and fundraising on behalf of hihi (Page 1). Our goals for HCCT's first three years were ambitious, focused on building national coordination across hihi sites, their associated community groups, and mana whenua. We aimed to employ a staff member to coordinate data collection across sites. These data would then be used to develop a shared adaptive management framework to inform recovery efforts nationwide, beginning with three translocations: one to reinforce an existing population and up to two others to establish new populations.

The challenge was how we could make these dreams for hihi a reality. That's where DOC stepped in. In 2019, we applied to the DOC Community Fund Pūtea Tautiaki Hapori, a programme directed toward 'practical projects aimed at conserving New Zealand's indigenous biodiversity.'

We were fortunate that our bid was successful, with just under \$250,000 (NZD) awarded to HCCT.

With two years remaining on our grant, we can already see the tremendous impact of DOC's generosity. HCCT employed its first Conservation Officer, Mhairi McCready, whose leadership and expert knowledge have greatly enhanced the quantity and consistency of data collected across sites. These data have informed a new adaptive management plan, which is set to roll out soon (Page 7). In 2020, we also established our seventh hihi population at Shakespear Open Sanctuary (Page 11). Thanks to DOC Community Fund Pūtea Tautiaki Hapori, hihi recovery has gained incredible momentum over the past year, which we are hopeful will last long into the future.



HIHI MANAGEMENT

A Look into the Future: An Adaptive Plan for Hihi Recovery



Hihi recovery has long been a successful example of collaboration between practical conservation and scientific research. Science helps with many aspects of hihi recovery: What food do they need? What is a good hihi habitat? What works, what doesn't – and what should we do next?

Science is at its best when approached as an experiment, testing and comparing different actions. However, experiments with endangered species are tricky. For example, if we think a hihi population is thriving, we might stop feeding it. If it keeps growing, we have learned something about dietary needs and could change feeding elsewhere. But what if the population crashes as a result? Was learning worth the risk? And how do we adapt our strategies to account for what we have learned? We need to answer such questions to plan the next two decades of hihi recovery and increase the scale and ambition of the programme.



Since 2015, Dr Stefano Canessa from the Zoological Society of London has been helping the Hihi Recovery Group develop a computer program to plan the next long-term strategy. In the first phase of the project, Stefano worked closely with HRG members John Ewen, Kevin Parker, Mhairi McCreedy, Doug Armstrong, and Liz Parlato, with additional guidance from Sarah Converse and Hannah Sipe of University of Washington (USA). Together with the HRG, they worked to define different options for the next stage of hihi recovery, balancing learning, translocations, and feeding regimens.

Some options are conservative. For example, we might choose to continue supplementary feeding indefinitely or commit to multiple years of releases until it is absolutely clear that populations are well-established. However, these strategies sacrifice learning to make sure nothing bad happens. Other options are more ambitious, taking short-term risks to increase learning. For example, supplementary feeding could be suspended at sites that seem to be doing well to learn how the population will respond; a riskier plan like this could include 'safety clauses' in case the population declines, such as restoring feeding or adding more birds via translocation. Some of the most extreme options are ones we might never seriously consider, such as never providing populations with supplementary food. Nevertheless, seeing how these riskier options could pan out from the safety of a computer simulation helps us understand worst-case scenarios.

All of these strategies were detailed as realistically as possible, taking into account how the HRG might react in different situations. Each was then converted into a computer program, which simulates many thousands of possible outcomes for each strategy: how hihi populations might respond to our actions, how we could measure and evaluate their responses, and how we would adapt feeding and translocation plans accordingly. Again, the input of the HRG was vital to ensure the model used the best information available to us, whether that meant diving into the long-term database collected across hihi sites or relying on the collective judgment of hihi experts.

The results of the simulations help us see which strategy will lead to the best outcome in the long-term, and how much risk it actually entails: how many birds we can hope to see in the future, how many new sites we should plan to establish and maintain, how much intensive management those populations will need, and a wealth of other information.

This program has taken several years to prepare and then weeks for the computer to complete the calculations, but results are finally coming in. For now, they are top secret! But they will soon be presented for discussion at an upcoming meeting of the HRG. This discussion will not set a fixed path for hihi recovery but will help the HRG navigate difficult decisions and weigh future options. Over the coming months, the HRG will use this knowledge to set an exciting new path for the next two decades of hihi conservation.



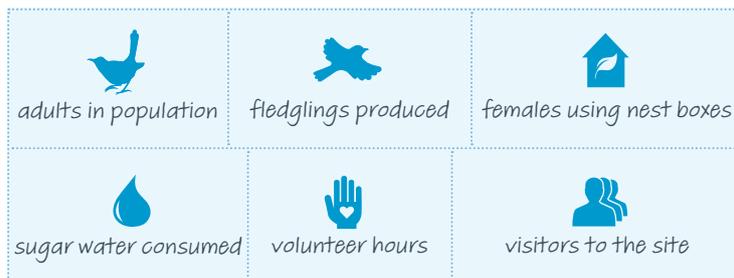
SITE UPDATES

Over the last year, staff, volunteers, and researchers at each site have been hard at work monitoring and caring for our eight hihi populations. Throughout the next 16 pages, we recognize their efforts, reflect on challenges, and celebrate successes. To track progress in relation to the Hihi Recovery Group's objectives (Page 2), we report the following metrics for each site:

The estimated number of adults in the population at the start of the last breeding season (September 2020), derived from an integrated population model

The amount of sugar water (in litres) consumed at supplementary feeders in the past year

AT A GLANCE



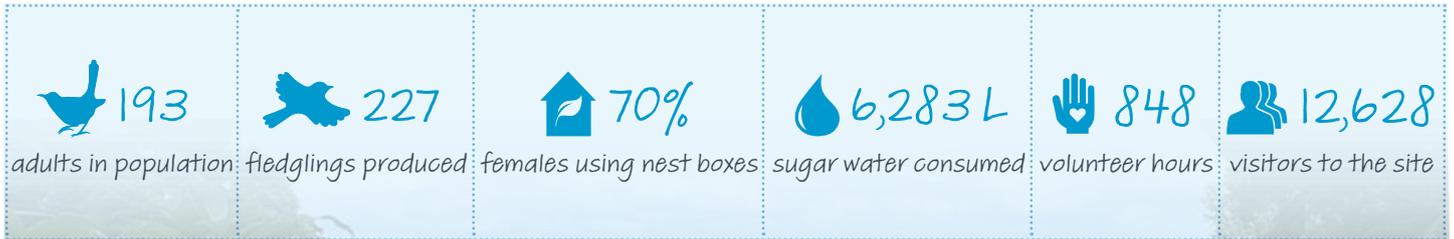
The number of chicks fledged from monitored nests in the most recent breeding season

The number of females that nested in nest boxes during the past breeding season (from monitoring data) as a percentage of the total number of females in the population (estimated from an integrated population model)

Monitored by each site

Tiritiri Matangi Island

AT A GLANCE



BACKGROUND

Tiritiri Matangi Island is a wildlife sanctuary and one of New Zealand's most exciting conservation projects. The island was stripped of nearly all its native bush following human occupation. Thanks to dedicated restoration efforts, approximately 60% of the island is now covered in native bush. All mammalian predators have been eradicated, and the island is now home to native birds, reptiles, and invertebrates. The project is managed by the Department of Conservation in partnership with the Supporters of Tiritiri Matangi Incorporated.

Tiritiri Matangi is frequently used as the source for hihi translocated to other sites and continues to be the focus of many research projects that contribute to our knowledge of the species. Of the thousands of people who visit the island every year, more than 4,600 are school students. The Growing Minds programme, run by the Supporters of Tiritiri Matangi Incorporated, funds 1,200 students from low decile schools who would not otherwise have the opportunity to visit the island.



POPULATION SIZE



NEWS

It was a rollercoaster year for the Tiritiri Matangi hihi and the people who care for them. After 40 birds were translocated to Shakespear Open Sanctuary to establish a new population, a close watch was kept on the remaining birds to ensure the translocation did not negatively impact the source population. In early October, the breeding season kicked off on the exact same day as at Shakespear, with a strong cohort of 64 females attempting a first clutch. However, things took a devastating turn when 13 females disappeared. Some were clearly the victims of ruru predation, as their nest boxes were surrounded by feathers.



The reduced number of breeding females took a toll on fledgling numbers, with only 133 fledged from first clutches. However, the surviving females picked up the pace, with an unusually high proportion attempting a second clutch. Thanks to these efforts, fledgling numbers bounced back and surpassed 200 for the third consecutive year. Enjoying his moment in the spotlight, the 227th (and final) fledgling decided to take his time leaving the nest, fledging at 51 days old – 21 days longer than the average hihi!



To celebrate the birds' amazing comeback this season, the hihi team put the bunkhouse oven to good use and treated themselves to an impressive five-tier cake. As our modelling predicts continued growth for this population, there will hopefully be many more achievements to celebrate (and many more cakes to bake) in the future.

Shakespear Open Sanctuary



BACKGROUND

Perched at the end of the Whangaparāoa Peninsula, Shakespear Regional Park was established in 1967 from land purchased by Auckland Regional Council. In 2011, an open sanctuary was created by installing a 1.7-km pest exclusion fence across the peninsula, enclosing 500 ha of land including the regional park, a New Zealand Defence Force facility, a Watercare wastewater facility, and a YMCA lodge based at the old Shakespear family homestead.

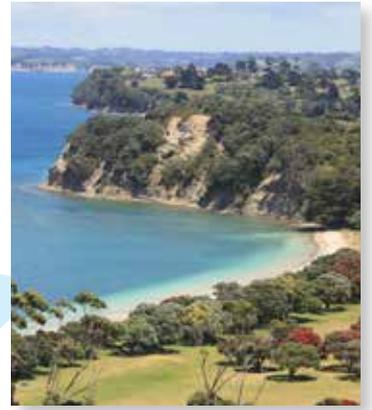
Today, the open sanctuary serves as a haven in which coastal forest, wetlands, dunes, and grassland can recover through ongoing revegetation programmes. The success of these efforts shines through as the habitat grows healthy enough to support many native bird species. Since 2015 alone, pōpokatea, toutouwai, tīeke, kiwi pukupuku, and hihi have all been reintroduced. With such incredible biodiversity less than an hour's drive from Auckland CBD, the impact for environmental education and awareness is tremendous. In a typical year, Shakespear welcomes 650,000 visitors, making it the most visited open sanctuary in New Zealand.

AT A GLANCE



NEWS

In 2020, an expert team of conservation biologists helped 40 juvenile hihi hop across the bay from Tiritiri Matangi Island to Shakespear Open Sanctuary. With only 3.5 km between these two sites, this was the shortest hihi translocation ever, but the challenges have been far from unique. As in many new populations, the Shakespear hihi have faced high mortality due to dispersal, disease, and predation. Nine months after release, the population sits at seven individuals despite seven chicks fledging during the breeding season.



Nevertheless, the hihi and humans of Shakespear provide many reasons for hope. Even with beautiful nest boxes available, some birds have shown an interest in natural tree cavities – a promising sign for habitat quality. Additionally, all hihi have been fitted with passive integrated transponder ('PIT') tags to help track their movements. This will provide valuable knowledge for future translocations, including a reinforcement translocation planned for Shakespear once an ongoing stoat incursion is controlled. As this new population gets up and running, special thanks go to programme sponsors Foundation North and Gulf Harbour Country Club; donors Maree Johnston, Midway Flooring, and i3; and the 'Crack Track Team' of volunteers who built a gorgeous new 'Hihi Bridge' for all to enjoy the sights and sounds of hihi!



Rotokare Scenic Reserve

AT A GLANCE

 56
adults in population

 36
fledglings produced

 48%
females using nest boxes

 284L
sugar water consumed

 513
volunteer hours

 30,000
visitors to the site

BACKGROUND

Rotokare Scenic Reserve is a stunning 230-ha hill-country catchment containing beautiful forest, wetlands, and a 17.8-ha natural lake, all protected by an 8.2-km pest exclusion fence. Hihi were reintroduced in 2017, ending a 130-year absence from the Taranaki region. Just 12 km from the township of Eltham, Rotokare is a popular recreation spot for boating, walking, and simply enjoying the beautiful scenery.

The Rotokare Scenic Reserve Trust was formed in 2004 out of concern for the declining state of the reserve. It is a community-owned, community-driven project and accommodates a wide variety of local interests including conservation and recreation. The Trust led construction of the pest exclusion fence and has continued to champion a range of conservation and recreation activities, including: high-level biodiversity restoration, total eradication of 12 introduced predator species within the fence, the establishment of a quality environmental education programme, revegetation of 12.5 ha of land gifted from neighbouring landowners, the establishment of on-site facilities (including a Site Manager's residence, workshop, and an education centre), and the reintroduction of native species that were previously rare or locally extinct.

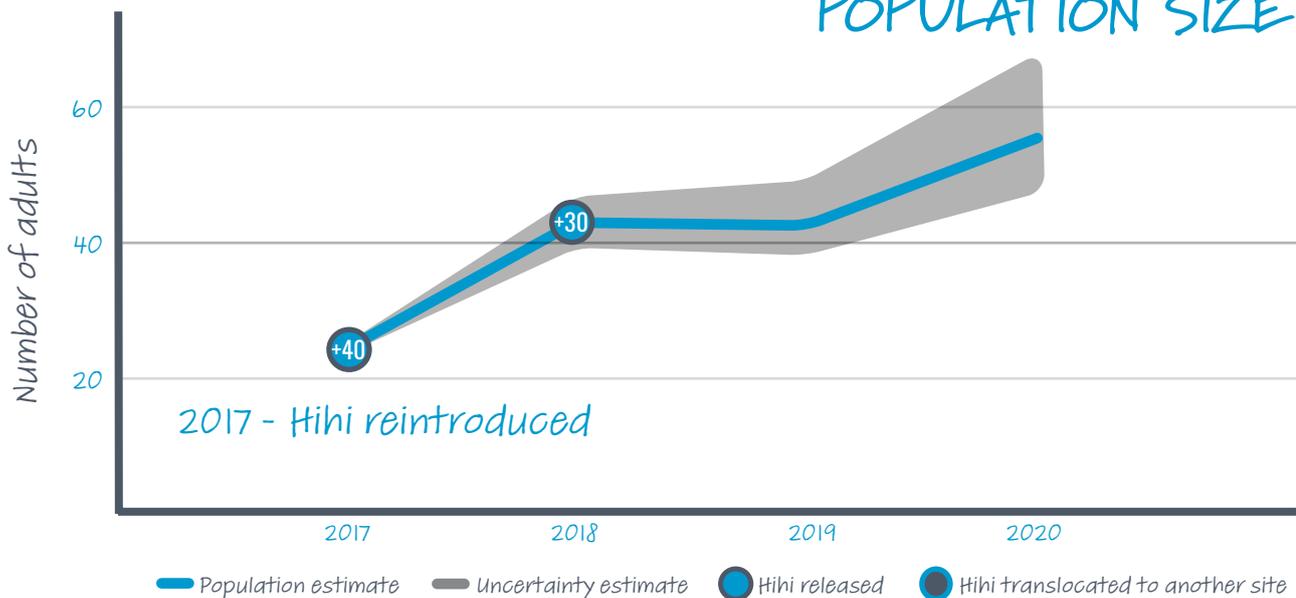
NEWS

'Community' has been the name of the game for Rotokare's hihi programme ever since the first release of birds in 2017. Volunteers make up the entire roster for filling and cleaning feeders, and sugar is donated by the local community. This year also saw a big upgrade to the bird kitchen – plumbed-in hot water! Rotokare also fosters community by welcoming countless visitors and campers each year. While 2020 saw an inevitable dip in international visitors due to the pandemic, there was an increase in domestic visitors seeking a sanctuary experience, rather than just a free campsite. Many visitors were able to spot hihi as they took in the beautiful scenery around the lake.

This year's breeding season saw 36 bright-eyed fledglings join the adult population, matching last year's total. Once again, some birds chose to nest in natural tree cavities rather than nest boxes, which speaks volumes about the quality of the forest. This four-year-old population may still be small, but it is already proving its might.



POPULATION SIZE



In March, the Rotokare team suffered an inconceivable loss with the sudden passing of Sanctuary Manager Simon Collins (Page 6). Simon's passing leaves a tremendous hole in the Rotokare family, but one thing that has never been in doubt is the strength and resilience of this community. Though Simon is no longer with us, the Rotokare team continue to honour his legacy by marching forward in their mission to conserve this incredible forest and the species that call it home. The hihi conservation community will be there to support them however we can.



Sanctuary Mountain Maungatautari

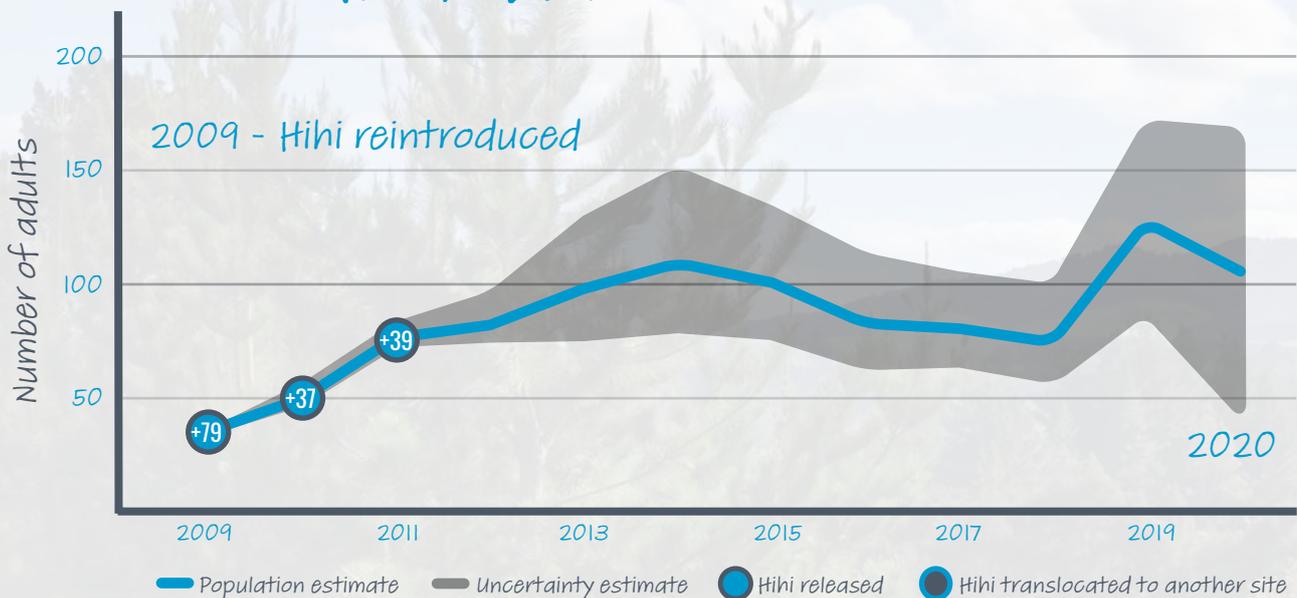
BACKGROUND

Sanctuary Mountain Maungatautari is a mainland ecological island located in the heart of the Waikato on New Zealand's North Island. This beautiful mountain sanctuary contains nearly 3,300 ha of broadleaf podocarp forest and is surrounded by a 47-km pest exclusion fence, which was completed in 2006. All mammalian predators were eradicated from inside the fence by 2007, except for mice, which have been excluded from several small enclosures within the reserve, including the Te Tū a Tāne Southern Enclosure.

The mountain's ancient forest offers a thriving ecosystem for populations of many of our most endangered species – from birds to bats, frogs to lizards, tuatara to giant wētā. Hihi are just one of 14 species that have been reintroduced to the site since the completion of the pest exclusion fence.



POPULATION SIZE



NEWS

The Maungatautari hihi population has long been shrouded in mystery. The birds here rarely visit feeders and do not use nest boxes, leaving 3,300 ha of stunning habitat for them to hide in. Over the last few years, the sanctuary team have put in a magnificent effort to increase monitoring efforts. Most recently, seven shiny new feeding stations were installed around the site in 2020. Although sugar consumption remains low, these feeders make it easier to view hihi, improving visitor experience and enhancing monitoring opportunities. Deploying camera traps at feeders helps capture additional sightings, which confirmed successful breeding in 2020/21. Other opportunistic findings provide important insight into the population. This year, one particularly well-known hihi was found dead on a track by conservation dogs, and a post-mortem revealed Aspergillosis.



In addition to the inherent challenges of working in such a rugged landscape, this year sanctuary staff also had to weather the COVID-19 pandemic. During lockdown, the dedicated operations team continued to feed hihi, though at a reduced rate of two rather than three times weekly. Thankfully, the new stainless-steel feeders are easier to keep clean and more difficult for kākā to tamper with, reducing the impact of this slight reduction in service. Significant track cutting was also undertaken in 2020 and continues into 2021, with plans to reopen all monitoring tracks over the next 12 months.



This year marks one decade since the last translocation of hihi to Maungatautari. This vast, mountainous site is surely one to keep an eye on as monitoring continues to improve and the population begins to trend slowly upward.



AT A GLANCE



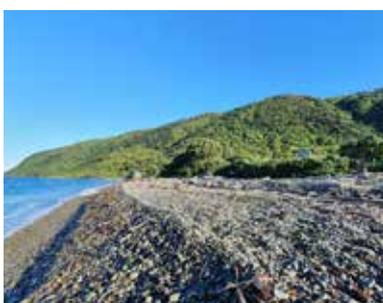
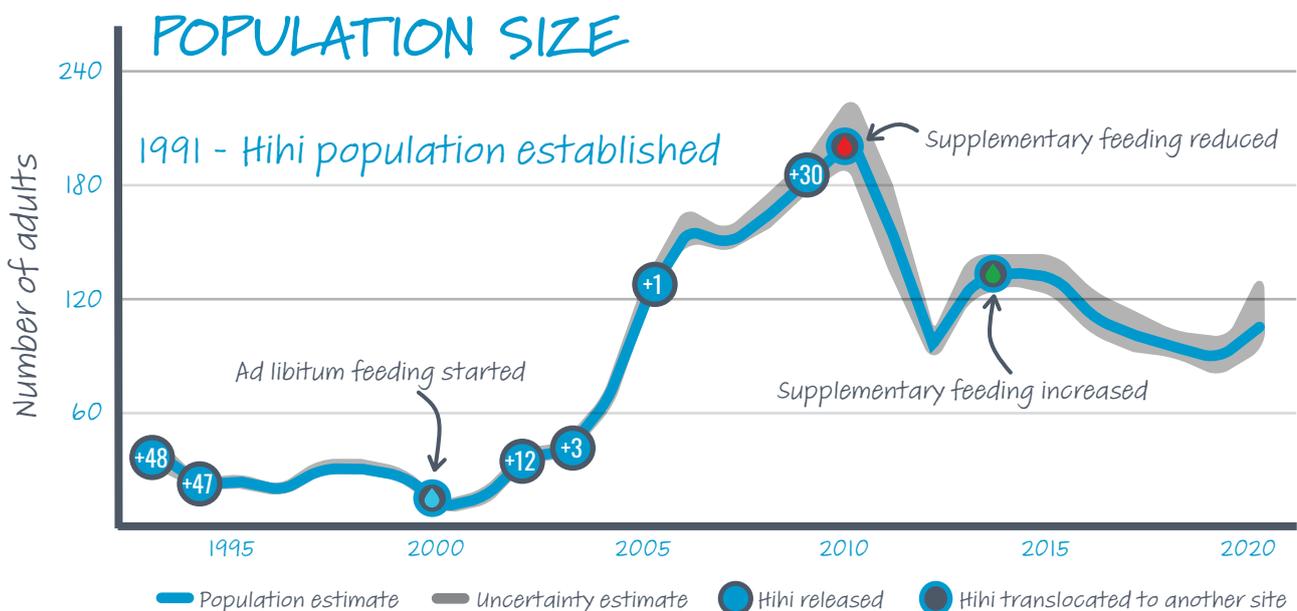
Kapiti Island



BACKGROUND

Kapiti Island is one of New Zealand's oldest protected areas, with most of its landmass being gazetted as a Nature Reserve in 1897. Located 5.5 km off the west coast of the lower North Island, it is 1,965 ha in size and 521 m at its highest point. The island was largely cleared for farming in the 1800s but has been naturally regenerating since. Possums and rats were eradicated by 1997, leaving the island free of introduced mammalian predators. Following a stoat incursion in 2010, the island was once again declared 'introduced predator free' in January 2013.

Hihi releases began on Kapiti in 1983 but were unsuccessful until 1991, when the current population took hold. Today, hihi favour two main areas of the island within major catchments descending from the summit. These areas have the highest plant diversity and rainfall and contain a large portion of the island's mature trees and old growth forest, which offer nesting cavities.



NEWS

Kapiti Island is one of the few sites where hihi do not use nest boxes, making it one of our most natural but difficult-to-monitor populations. This year, the pre-breeding survey identified 113 individuals, the highest number in at least 10 years. Without nest boxes, there is no way to closely track breeding activity or band nestlings before they fledge. To keep a pulse on the population, the Kapiti team make a valiant effort each year to catch and band unbanded birds at feeding stations. This year, their hard work paid off with the addition of 42 banded birds to the population tally.

Another positive sign for hihi this year was a prolific and extended season for many natural food sources. Sugar water consumption dropped as birds abandoned the feeders in favour of fruits and flowers. This is exactly the response we hope to see, as it confirms that sugar water acts as a fallback food for hihi when they need it but does not distract them from natural foods. On Kapiti, having hihi forage away from feeders provides the added benefit of extra viewing opportunities for visitors who do not want to make the half-hour climb uphill to the first feeder.

The uniqueness of Kapiti also makes it an excellent site for learning opportunities. Due to the steep terrain, feeders cannot be replenished daily and sometimes run out before they are refilled. Staff have been experimenting with miniature battery-powered scales to record the weight of each feeder and track when it is emptied. This data will help to inform future decisions on population management.



AT A GLANCE

 107 adults in population	 unknown fledglings produced	 0% females using nest boxes
 3,417L sugar water consumed	 2,395 volunteer hours	 13,591 visitors to the site

Bushy Park Tarapuruhi

AT A GLANCE



46

adults in population



24

fledglings produced



53%

females using nest boxes



272L

sugar water consumed



1,031

volunteer hours



10,000

visitors to the site



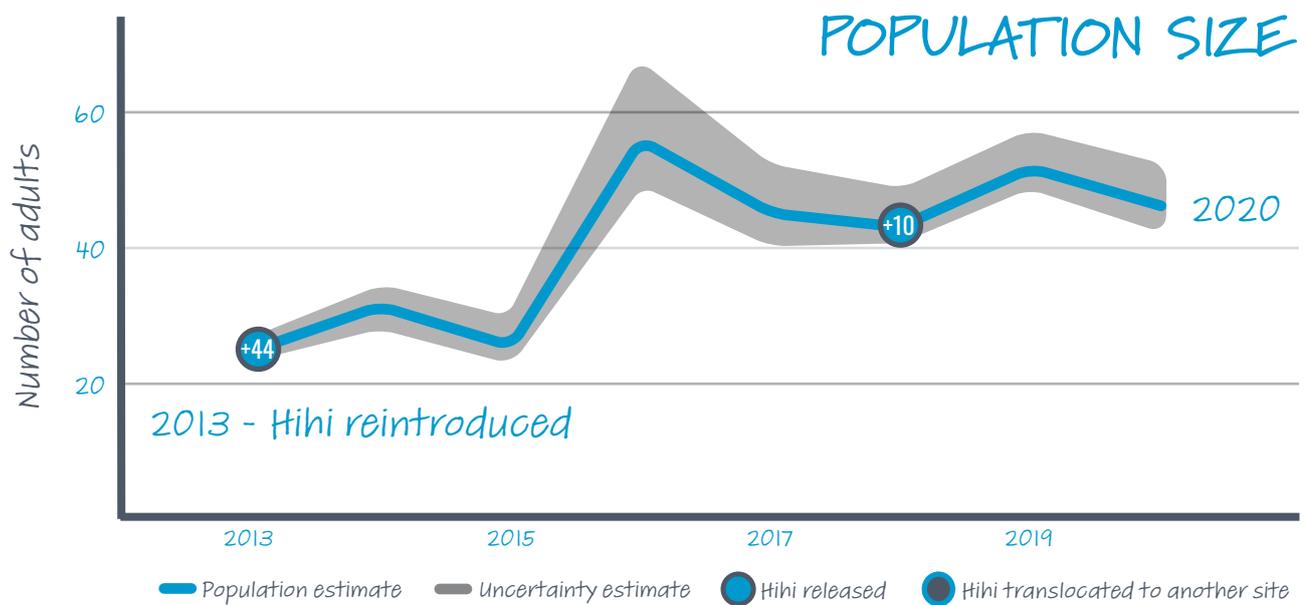
BACKGROUND

Bushy Park Tarapuruhi is a 98-ha conservation area situated 24 km northwest of Whanganui on the North Island's West Coast. It comprises 87 ha of mature lowland temperate forest, with tawa, pukatea, northern rātā, rimu, and rewarewa predominant and 11 ha of gardens and pasture around a historic Edwardian-era homestead.

It was bequeathed to the Royal Forest and Bird Protection Society in 1962 by the late G.F. Moore, a prominent Whanganui farmer. Today the sanctuary is governed by the Bushy Park Trust in partnership with Forest and Bird and Te Kaahui o Rauru, plus significant support from Horizons and DOC. Protected from major disturbance for over 100 years, the forest is a prime example of an intact forest ecosystem.

Predator control was achieved in 2005 following construction of a pest exclusion fence around the forest. This has allowed successful reintroductions of toutouwai, tīke, and hihi.





NEWS

Bushy Park Tarapurui is home to one of our smallest but steadiest hihi populations. This year marks 8 years since the initial reintroduction of 44 birds and 3 years since a reinforcement translocation brought 10 more birds to the site. The population typically hovers around 40 to 45 adults but struggles to maintain substantial numbers of females. However, this year's breeding season saw an impressive doubling of females from 8 to 16 individuals. Hopefully, these females will survive through the winter and position Bushy Park to have a monumental breeding season next year.



Community involvement has always been vital to hihi recovery at Bushy Park, and this year was no exception. Volunteers continue to be key in the regular roster for cleaning feeders, refilling sugar water, and checking nest boxes. Students come from around New Zealand and even overseas to contribute to hihi management and research. This year, Fern Kumeroa helped monitor the breeding season through November under a New Horizon Matariki scholarship from Massey University. Otago University Master's student Emma Gray picked up where Fern left off and completed monitoring through to the end of the season. As in previous years, Sara Treadgold (DOC) and Doug Armstrong (Massey University) generously lent their technical expertise when the time came to band nestlings, and Hihi Conservation Officer Mhairi McCready (funded by the Hihi Conservation Charitable Trust) played a critical role in conducting the pre-breeding survey and banding any chicks fledged from natural nests. This population is sure to thrive under the watchful eyes of so many budding and experienced hihi biologists!

Zealandia Ecosanctuary

BACKGROUND

Located just 10 minutes from downtown Wellington, ZEALANDIA is the world's first fully fenced urban eco-sanctuary, with an extraordinary 500-year vision to restore a Wellington valley's forest and freshwater ecosystems as closely as possible to their pre-human state.

The eco-sanctuary is a ground-breaking conservation project that has reintroduced 18 species of native wildlife back to the area, 6 of which were previously absent from mainland New Zealand for over 100 years. The 225-ha sanctuary valley is fully enclosed by an 8.6-km fence that excludes 14 types of mammalian predators, and has seen huge success over the past 20 years thanks to dozens of community groups, hundreds of volunteers, thousands of members, and millions of dollars in donations and funding.



AT A GLANCE



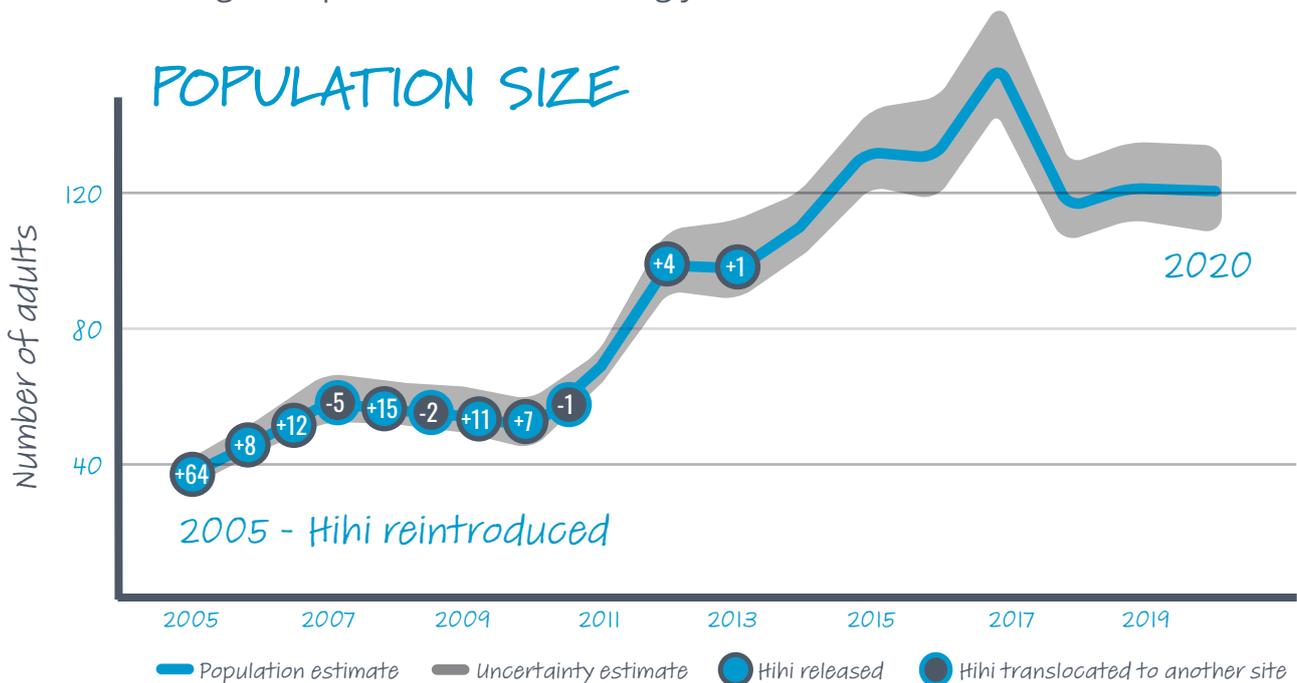
NEWS

After a challenging 2019/20 breeding season, hopes were high that the ZEALANDIA hihi would rebound with a strong showing this year. However, by mid-November, the breeding season was only just beginning, marking the latest start date ever for this population. Hopes of a productive season continued to fade as 40% of nests failed to hatch any eggs in their first clutch. Yet, against all odds, fledgling numbers began to pick up as hihi persevered through their second clutches. In the end, 59 chicks fledged successfully, nearly double the previous year, and we hope the population is back on track. An important reminder to never count hihi out until the last chick has fledged!



The breeding season was made even more remarkable by two notable nests observed by the ZEALANDIA team. First, a female hihi was forced to abandon her nest just before egg-laying when a pesky bumblebee hijacked it for its own use. This tiny nest thief highlights the hihi's vulnerability to threats both large and small. In happier news, a second nest provided a heart-warming case of inter-nest adoption. After undergoing veterinary treatment for ten days off-site, a young hihi chick was placed into a surrogate nest, where she was happily accepted by her adoptive parents and siblings before fledging successfully.

The ZEALANDIA hihi are fortunate to be supported by a tireless team of sanctuary staff, volunteers, and members. With this support, plus a fleet of shiny new hihi feeders being deployed across the site, there's great optimism for the coming year.



Te Hauturu-o-Toi

BACKGROUND

Located 80 km northeast of Auckland, Te Hauturu-o-Toi (or Little Barrier Island) is described as 'the most intact ecosystem in New Zealand.' Established as a nature reserve in 1895, it is considered one of the most important reserves of its kind in the world. Entry is strictly by permit only.

The island is managed in partnership between Ngāti Manuhiri and the Crown, by the Auckland region of the Department of Conservation. Te Hauturu-o-Toi is an iconic site for Ngāti Manuhiri and is of cultural, spiritual, and historic significance. The island's name comes from its highest point, 'the windblown summit of Toi.'

Te Hauturu-o-Toi's 3,083-hectare landmass makes it one of New Zealand's largest offshore island reserves. It is home to a greater number of endangered birds than any other island in the country. In addition, the island's biodiversity includes two species of bat, an endemic giant wētā, reptiles such as the northern tuatara, and over 400 species of native plants.



NEWS

Stepping onto Te Hauturu-o-Toi is like stepping back into New Zealand's past. In fact, the island provides our only glimpse of what hihi populations might have looked like long ago, without the intensive management that all of our reintroduced populations depend on today. The population is guarded against non-native mammalian predators thanks to the island's strict biosecurity protocols, but it is otherwise unmanaged, with no supplementary food or nest boxes provided. So, what keeps this population going strong while others depend so heavily on our help?



Hihi researchers would jump at the chance to answer this all-important question, but opportunities to visit Te Hauturu-o-Toi are few and far between. To protect the pristine ecosystem, entry requirements are understandably strict, and the remote and rugged landscape requires careful planning before embarking on any research expedition. When hihi researchers do step foot on the island, the data collected are extremely precious and can be pored over for years to maximize learning.

That's the case for the most recent hihi research expedition to Te Hauturu-o-Toi. Accompanied by a team from the Hihi Recovery Group and Department of Conservation, Dr Alex Knight (then a PhD student at the University of Auckland) travelled to the island in 2018 to assess hihi genetics. So far, results have been encouraging. The population appears to be genetically well-mixed, so birds translocated to other sites in the future can be caught from the most accessible corner of the island, with the assurance that they reflect the genetic diversity of the entire population. In their ongoing work, Alex and his PhD supervisor, Dr Anna Santure, are diving into another dataset collected on the island, comparing disease infection rates of the Te Hauturu-o-Toi birds to those on Tiritiri Matangi Island. Each expedition to Te Hauturu-o-Toi only scratches the surface of this enigmatic population, and we cannot wait to see what researchers discover in the future!

RESEARCH HIGHLIGHTS

A key strength of the Hihi Recovery Group is the research partners which are part of it. Each year, researchers produce high quality science examining hihi ecology and conservation, which goes on to be published in peer-reviewed, specialist journals. We highlight a range of these which have been published in the last year below.

Hihi populations provide a world-renowned study system in small population recovery and reintroduction biology. Alongside our long-term HRG academic members, we are particularly proud of supporting a growing number of research students through MSc and PhD studies. We see this as a winning formula – growing both the number of hihi we have and

the number of future conservation leaders for the world! This year students Fern Kumeroa (Massey University) and Emma Gray (Otago University) provided valuable assistance monitoring hihi at Bushy Park Tarapurui. We wish them the best of luck in their continued studies.

We especially want to congratulate Dr Caitlin Andrews for completing her PhD on hihi foraging at University of Cambridge & Zoological Society of London, Dr Alex Knight for completing his PhD on hihi genetics and disease at University of Auckland & ZSL, and Sarah Nichols for receiving a first for her MRes project on hihi genetics at University College London & ZSL.

Foraging behavior alters with social environment in a juvenile songbird

A major benefit of sociality is that it gives individuals the opportunity to learn new behaviours by observing others. This can be especially crucial for young animals as they learn to forage and develop other important survival skills. Yet, as they gain independence from their parents and begin to associate with peers, juveniles face a dilemma: when they encounter multiple sources of information, who should they learn from?

Here, Dr Vix Franks (PhD; University of Cambridge & Zoological Society of London) and colleagues explored what happens when young hihi on Tiritiri Matangi Island receive conflicting information from parents and peers. Soon after fledging, juveniles were trained to enter a feeder either through a left or right entrance, following

their parents' preference. After dispersing from their natal territories, they naturally congregated into juvenile 'gangs' around new feeders. Although these gangs contained juveniles with 'left' and 'right' preferences, each group eventually settled on a shared preference for one side or the other. Evidence for behavioural conformity like this is rare in wild birds, so this study could have a big impact on our understanding of how cultural traditions arise.

Reference: Franks V.R., J.G. Ewen, M. McCready, & R. Thorogood (2020) Foraging behavior alters with social environment in a juvenile songbird. Proceedings of the Royal Society B 287(1939):20201878.

A modelling framework for integrating reproduction, survival and count data when projecting the fates of threatened populations

Predicting the future trajectory of a population is a critical step for species recovery programmes. When we predict a decline, we can intervene to increase the population's viability. When we predict an increase, we receive some assurance that our current management protocols are working. Maximizing the accuracy of our population models is one of the main reasons we monitor hihi so closely, gathering data on as many individuals' reproductive success and survival as we can. However, population monitoring is filled with uncertainty. Sometimes, individuals escape our watch, so how can we account for these individuals in our analyses?

Here, Dr Liz Parlato (Postdoc; Massey University) and colleagues used an impressive dataset from five hihi populations (Tiritiri Matangi Island, Zealandia Ecosanctuary, Sanctuary Mountain Maungatautari, Bushy Park Tarapurui, and Rotokare Scenic Reserve)

to develop a novel population modelling framework that allows for imperfect detection of individuals. The framework enhances population estimates by allowing us to include an individual in our population models even if we are missing data on their sex, survival, or reproductive success. This method will undoubtedly be used by the Hihi Recovery Group to model populations and inform management going forward. Hopefully, it will also be picked up by biologists working with other threatened species, bringing an even wider benefit to conservation.

Reference: Parlato E.H., J.G. Ewen, M. McCready, K.A. Parker, & D.P. Armstrong (2021) A modelling framework for integrating reproduction, survival and count data when projecting the fates of threatened populations. Oecologia 195:627-640.

Consequences of space sharing on individual phenotypes in the New Zealand hihi

One of the puzzles of evolutionary biology is how genetics and the environment interact and give rise to diversity within populations. Teasing apart these two effects is especially complicated in species where individuals are spatially dispersed in a heterogeneous landscape. When neighbours look or behave similarly, is it because they are genetic relatives, because they learn from each other, or because they share a common environment?



Here, Dr Alexis Rutschmann (Postdoc; University of Auckland) and colleagues tackled this question by studying hihi at Zealandia Ecosanctuary. Individuals with overlapping home ranges (i.e. neighbours) had more similar body mass (as nestlings) and egg laying dates (as adults) than non-neighbours. Critically, neighbours were unlikely to be genetically related. This suggests that similarities among hihi at Zealandia can be attributed not only to their shared genes, but also to a close social environment and similar home range. Overall, the study highlights the importance of accounting for spatial overlap in quantitative genetic models and adds hihi to a small list of species where this has been accomplished in wild populations.

Reference: Rutschmann A., P. de Villemereuil, P. Brekke, J.G. Ewen, N. Anderson, & A.W. Santure (2020) Consequences of space sharing on individual phenotypes in the New Zealand hihi. Evolutionary Ecology 34(5):1-19.

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Caitlin Andrews
John Ewen
Mhairi McCready

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