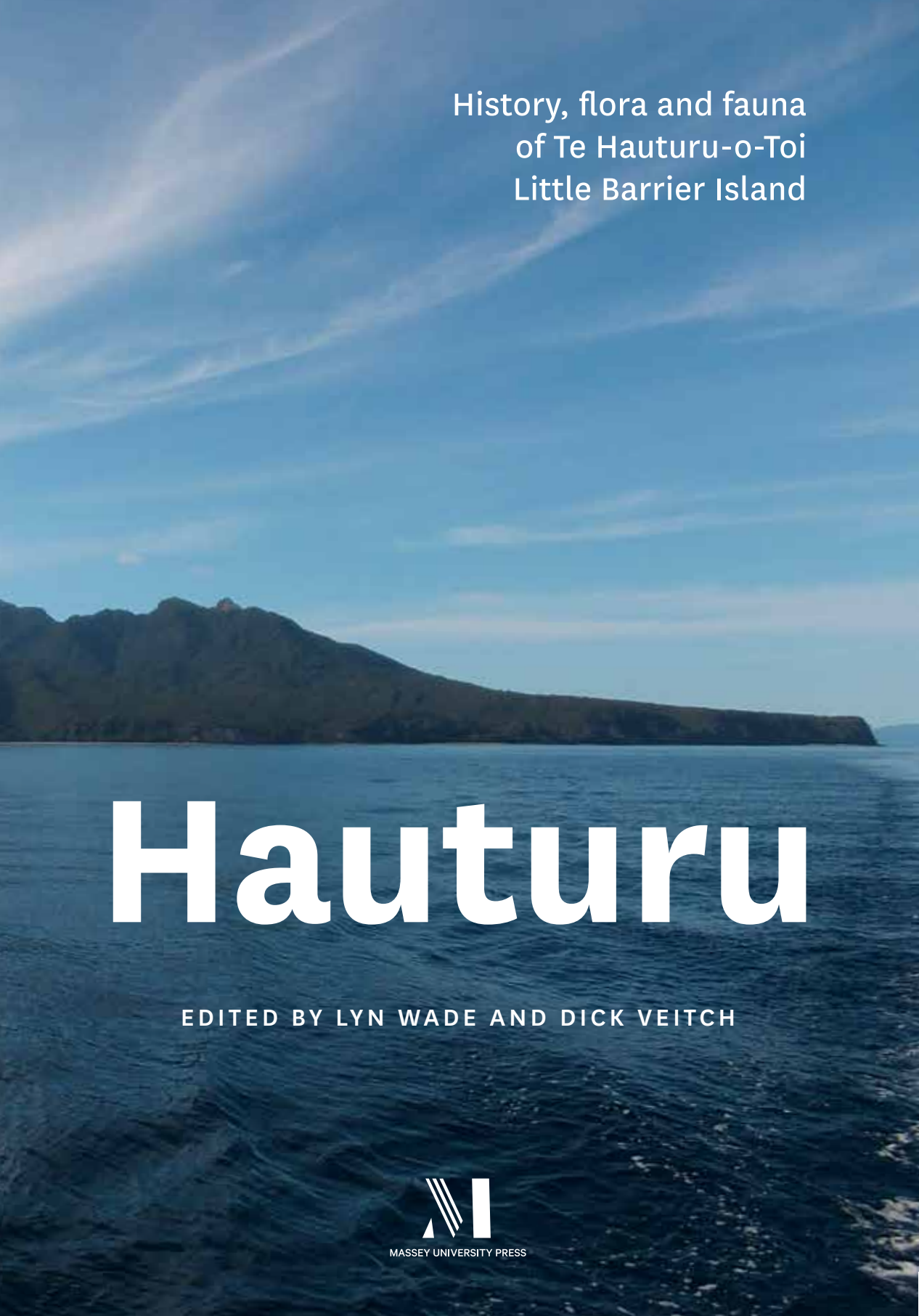
Hauturu



History, flora and fauna
of Te Hauturu-o-Toi
Little Barrier Island

Hauturu

EDITED BY LYN WADE AND DICK VEITCH

MASSEY UNIVERSITY PRESS

Manuhiri te tupuna
Manuhiri te tangata
Manuhiri te tapu
Haumi ē, hui ē, taiki ē

There have been many books, stories, narratives, films and discussions on the history of Te Hauturu-o-Toi. All of them have versions of the early Māori history through to recent times that are a mixture of myths, legends, extracts from Native Land Court records and oral conversations with individuals — versions that have no connection at all to Ngāti Manuhiri or to any true accounts of whakapapa and tikanga. Some of them have good factual content, but none has the traditional kōrero handed down only to those who were chosen by their tūpuna to be the repositories of the history of Ngāti Manuhiri and Te Uri-o-Papa, the last tribal grouping of iwi to live and sustain themselves on Te Hauturu-o-Toi for hundreds of years before they were forcibly removed from the island by government forces.

The island has been inhabited by Māori for more than 400 years. It was settled in the mid-1600s by the ancestors of Ngāti Manuhiri and Ngāti Rehua. These large groupings had already settled in the Mahurangi and Kaipara areas and had then proceeded to raupatu over the offshore islands, including Hauturu-o-Toi.

Manuhiri's tūpuna came from Kāwhia and northern Taranaki. They were descendants of the *Tainui* waka. Tribes such as Ngāti Manaia later joined in customary unions with Ngāti Manuhiri people, forming an alliance with the Ngāti Wai tribes from the north.

Te Hauturu-o-Toi gained national recognition in the late 1800s when the government first sought to purchase the island and, when that was rejected, enacted legislation to make Hauturu a conservation estate, owned and managed by the Crown. This decision led to many appearances and hearings in the Native Land Court, where Ngāti Manuhiri were put under huge pressure in their efforts to retain their customary ownership. Tenetahi Pohuehue, his wife Rahui Te Kiri, their children Ngapeka and Wi Taiawa and tohunga Hone Paama argued their case against others — European and Māori — who were contesting their ownership entitlement based on customary rights and responsibilities cemented by tikanga.

Te Hauturu-o-Toi will always be culturally and spiritually significant to the identity of Ngāti Manuhiri people. Almost 150 years since the first court action, the Waitangi Tribunal process has returned the island to its rightful owners, with an apology for wrongful actions in the past. Today, Ngāti Manuhiri have customary rights and interests extending from Takapuna in the south to Bream Head in the north and to the offshore islands, including Te Hauturu-o-Toi. We have now gifted this island, as a wonderful nature reserve, to the people of New Zealand.

Terence (Mook) Hohneck, Ngāti Manuhiri
Nicola MacDonald, Ngāti Rehua

Kaka, 1984, by Don Binney. Don Binney was the Little Barrier Island (Hauturu) Supporters' Trust founding patron. Courtesy of the Binney family and the University of Auckland Art Collection. *Previous*: Te Hauturu-o-Toi/Little Barrier Island. (LW)

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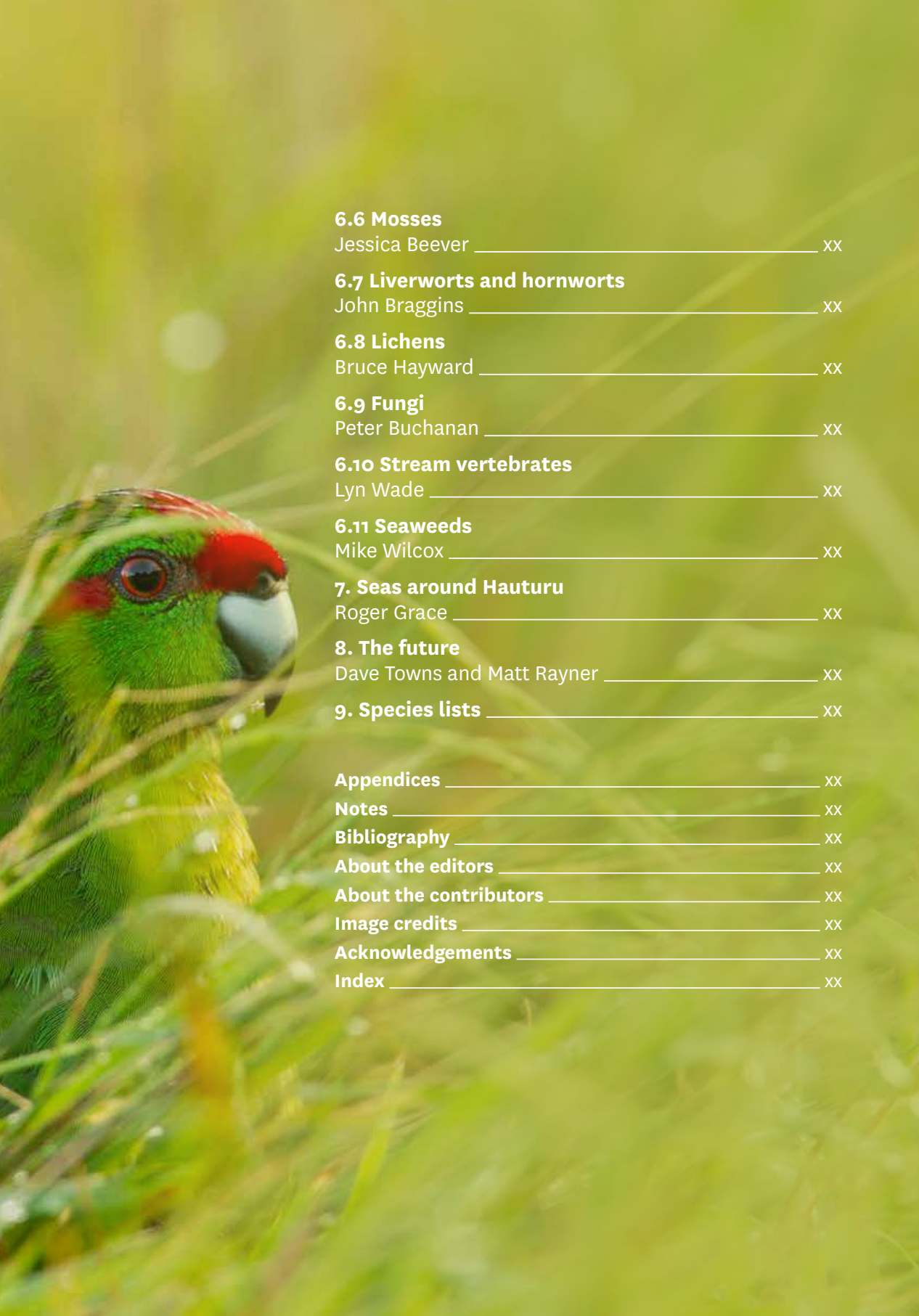
Red-crowned kākāriki (*Cyanoramphus novaezelandiae*) (NF)



Foreword

RUUD KLEINPASTE

Te Hauturu-o-Toi/Little Barrier Island has always been a magical island in my life. I read about it before I migrated from the Netherlands to New Zealand, more than 40 years ago. As a young and mad nature nerd, I quickly realised that the biota and ecology of New Zealand were very special indeed, and that Hauturu was the ultimate ark of endangered species with, arguably, the least modified environment in the north of Aotearoa. It fitted nicely with the concept of conservation; the management of our fragile ecological systems and the safe-keeping of our most endangered species.

Of course, all those years ago we really did not have a workable plan of what to do with these taonga, apart from keeping them safe on offshore islands. There was no bold and audacious predator-free concept, and even the appreciation of nature and ecological values was limited to dedicated scientists, small groups of citizens and the tramping, hunting and fishing communities.

These days there is a fast-growing awareness that we need to act when it comes to our biodiversity, and other environmental issues for that matter. I believe the word 'conservation' has been overtaken by restoration, regeneration and rehabilitation (action, in other words) and by a concept that starts with the fourth 'r': reconciliation (asking nature's forgiveness).

When I was invited to join the Little Barrier Island (Hauturu) Supporters' Trust in 1997, I didn't hesitate to accept. This was the perfect opportunity to visit the island and raise some much-needed funds to assist the Department of Conservation with special projects. We also raised awareness of this unique island, from biosecurity issues to stories about endangered species.

Everybody who visits Hauturu has a different experience. Most reflect on the bigger picture involving the future of Aotearoa, our ecosystems and humanity's chances of survival on the planet. Hauturu has some lessons for us. In a world that has seen life for around 3.8 billion years, the arrival of *Homo sapiens*, a mere 150,000 years ago, has had some catastrophic consequences, especially in our later stages of conquering the planet. The word Anthropocene — the proposed name to describe the current geological time period — is aptly chosen. We all know the main points: carbon (energy), climate, ocean acidification, atmospheric and stratospheric aerosols, water quality, bio-geochemical contamination, land use, habitat loss . . . the list is endless. Economic growth at all cost

Te Hauturu-o-Toi main landing looking up to the summit ridge and Mount Herekohu, 'The Thumb' (694 metres). (SF)

isn't helping matters, and few people recognise that our planetary loss of biodiversity (species going extinct at a rapid rate of knots) is the largest 'Health and Safety' hazard we are facing!

When I stroll around the island, by day or by night, I see creatures, fungi and plants in a delicate dance of design and collaboration, creating biological relationships that have stood the test of time. I then realise that we know very little about what makes these systems tick or how it all operates. It also becomes abundantly clear that we haven't got a clue about which species are in play and what their role is in the greater scheme of things.

Taxonomy, ecology and ecosystem services are some of the basic concepts of life, and Hauturu has bucketloads of them. As a result, the ark is becoming bigger and more complex with every new discovery. But Hauturu is so much more than just an ark. It shows us an even bigger picture. As a species, *Homo sapiens* is a real Johnny-come-lately. We joined an already existing and sustainable biosphere and managed to dominate the system in a relatively short time. We have grown to huge populations, are making big mistakes and have been likened to toddlers playing with matches. That begs the question of how all the other species in our ecosystem view us: Are we welcome?

I have noticed that our biological control agents (predators, parasites and pathogens) are quite excited about the number of humans on the planet; all our global diseases are becoming very good at playing the genetic arms race. But the species that generate ecosystem services beneficial to humans tend to lose interest, so to speak.

There is no doubt about the fact that we need to rediscover the operations manual of planet Earth. We need to change the way we live here, on Earth. That's pretty hard, seeing we have rapidly lost our connection to nature in the age of technology. Numbers of eyeballs and clicks are the new currency of disconnect. We need nature-literacy, eco-literacy, call it what you like; we need to become bio-lingual.

It is not surprising that education facilities are becoming more and more interested in using the environment as a context for education. It can start as young as early childhood education, following through primary and intermediate school (the years of maximum engagement) to secondary and tertiary levels, where the science and discovery rubber hits the road. Hauturu, literally, is nature's classroom. No, I am not talking about learning *in* nature or learning *about* nature — documentary-style information made famous by Sir David Attenborough and other wonderful media personalities — although that helps. Hauturu is the best place to learn *from* nature. It has an official name, biomimicry, and it steers us in the direction of learning from nature's best ideas and what life already knows. Nature has been writing the book on biodiversity and ecology for billions of years, and I believe it has urgently become required reading for humanity.

Here are some of the best lessons from Hauturu:

- Nature runs on current sunlight — not fossil sunlight
- It only uses the energy it needs
- The forests stabilise climate and mitigate weather extremes
- Everything is recycled (or rather *up*cycled)
- Nature simply doesn't know the concept of waste
- It relies on local expertise, rewards collaboration and beneficial, symbiotic relationships

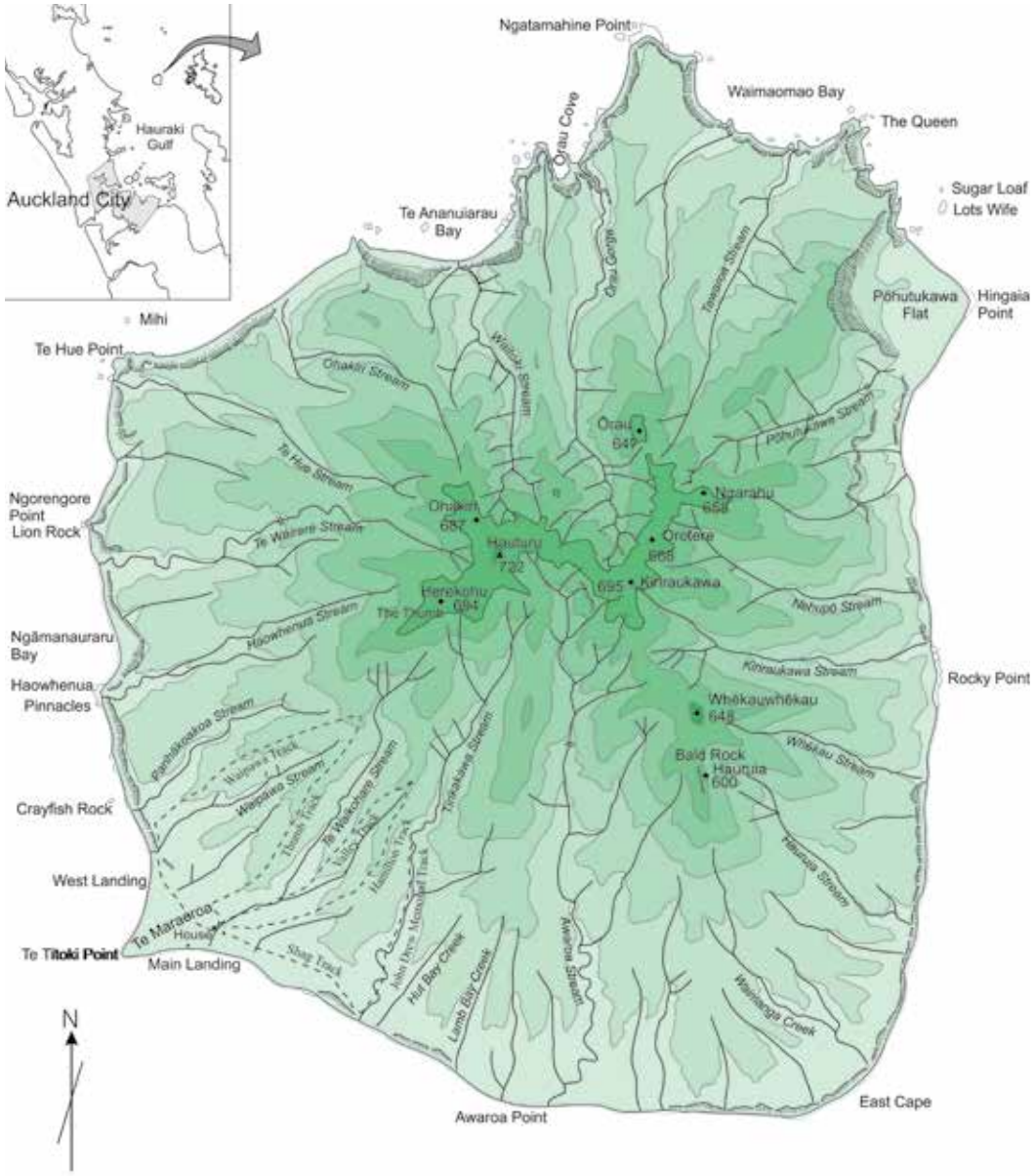
- Nature rarely competes; it mostly facilitates
- It has limits (growth, resource accumulation, where genes move to . . .)
- Nature does chemistry in water and uses a small and safe subset of the periodic system
- Life in the ecosystems is generous, full of diversity and productive
- And Hauturu creates a wonderful state-of-mind.

There are many more learnings from Hauturu — you'll just need to go and experience these for yourself, if you get the chance. But the authors of this book have started the journey for you, by describing some of the pertinent human, geological and natural history of this magical island.

Where do you find an effective ark for endangered species, which doubles as a mirror for humanity's actions and has the power to become the most inspirational outdoor classroom in Aotearoa? Somewhere in the Hauraki Gulf, I reckon!

Chapter one
Introduction to Hauturu

— MATT RAYNER



HAUTURU / LITTLE BARRIER ISLAND

0 1 2 3 km

Scale

Contour intervals are 100 metres

The remote isolation of the islands of New Zealand in the vast Pacific Ocean influenced the unique evolutionary development of the country's flora and fauna and, as a result, its vulnerability to the impacts of human arrival and settlement from the twelfth century. Over time these human migrant New Zealanders — Māori, Pākehā, Polynesian and other cultures — have developed an intimate awareness and love for Aotearoa's natural island landscapes. This love of islands is central to many New Zealanders becoming global conservation champions and world leaders in the science and management of saving island species. Te Hauturu-o-Toi/Little Barrier Island is a jewel in this conservation crown.

Positioned at the entrance to Te Moananui-o-Toi/Hauraki Gulf, 70 kilometres from Auckland, Hauturu is named for its highest peak, 'the windblown summit of Toi'. Toi Te Huatahi, a Polynesian navigator, was the first person to discover and name the island, more than 800 years ago. Hauturu was named Little Barrier Island in 1769 by Captain James Cook during his first voyage to New Zealand; and he named the larger island, Aotea, Great Barrier Island.

Hauturu is New Zealand's largest island nature reserve (excluding the subantarctic islands), with a surface area, taking into account the slopes of the land, of more than 4000 hectares. Rising to an altitude of 722 metres above sea level (asl), the island represents the remains of a mid Pliocene to early Pleistocene (3.1–1.2 million years) volcano, with steep valleys radiating out from a series of high peaks. At lower elevations, knife-edge ridges or more gentle slopes fan out, and many of these terminate in sea cliffs up to 250 metres high. Streams and waterfalls dissect the coastline, which is made up of near-continuous boulder beaches in the east and south and rocky points and high cliffs in the north and west. Prevailing winds are from the southwest; however, winds from any direction interact with the topography to create the frequent cap of cloud over the high peaks for which the island is known.

The flora and fauna of Hauturu have a close affinity with those on the New Zealand mainland, particularly the North Island, and much higher biodiversity than on more remote oceanic islands of similar size. To understand this diversity we must travel back in

Previous: Aerial view of Hauturu from the south, with Te Maraeroa to the left. (WJ)

time by around 18,000 years. With the last ice age at its coldest, the sea level around New Zealand was approximately 130 metres lower than it is today and the coastline, as a result, was well beyond Hauturu and neighbouring Aotea. Although they are isolated islands now, Hauturu and Aotea were linked by dry land and, along with the Coromandel Peninsula, were simply high points on a vast coastal plain that is today the Hauraki Gulf. The forests of Hauturu may have resembled those of today because the island was still north of the southern boundary of warm temperate forest. With continuous dry land (other than rivers and streams) there were no barriers for flightless species to cross to reach the higher ground of Hauturu; now-extinct giants such as the four North Island moa species would have wandered on Hauturu's wooded slopes. Subsequently, however, the climate began to warm and sea levels gradually rose. By 12,000 years ago links with the Coromandel Peninsula were becoming submerged, and by around 10,000 years ago Hauturu became isolated from all other land masses. The island formed was still much larger than the one we see today, but as sea levels continued to rise and the island area gradually reduced, some of the species trapped there would have lost access to vital resources and died out. Many others survived and are present today as reminders of this history of connection with the mainland — including wētāpunga (the Little Barrier giant wētā), tuatara, a host of lizard species and poorly flighted birds such as tīeke and probably kōkako. In effect, what remained on Hauturu was a fragment of the fauna and flora typical of the adjacent North Island. It is for this reason that most islands in the Hauraki Gulf are referred to as continental islands, distinct from the oceanic islands such as the Kermadecs and Galápagos that have never had these continental links.

From a distance, Hauturu's forested, mist-clad peaks and deeply cut gorges are awe-inspiring. But to visit and step onto its shores is to realise that Hauturu is more than special, it is a spiritual place, a place that Māori and Pākehā alike have viewed with a reverence that stems from the natural wonders of the island, its life force, its mauri. Hauturu represents a bastion for a devastated natural New Zealand where native biodiversity has been silenced by the axe, fire, or the teeth of introduced browsers and predators. Amazingly, the island was not subjected to the effects of most of the invasive mammals that were deliberately or accidentally introduced to the mainland. Furthermore, although some particularly damaging predators such as ship rats, Norway rats and stoats reached other large islands in the Hauraki Gulf, they were never introduced to Hauturu. These mammals became so widespread elsewhere in New Zealand that the largest northern offshore island to avoid them completely was Tawhiti Rahi in the Poor Knights, which is only 151 hectares in size. For an island the size of Hauturu to have been exposed to only two resident invasive mammals — kiore (Pacific rats, *Rattus exulans*) and cats (*Felis catus*) — is extremely unusual.

Now that the last of the introduced mammals have been removed from Hauturu, the island has gained even greater significance as a nature reserve. Although larger islands have been cleared of introduced mammals, they are in remote locations with extreme climates. They include subantarctic islands such as Campbell (11,200 hectares) and

Mount Ōrau in the mist from the summit ridge. (LW)

Macquarie (12,800 hectares), but these islands have nowhere near the range of plant and animal species found on Hauturu. From an international perspective, in terms of both conservation values and its rich species diversity, Hauturu is unique — there is nothing quite like this island elsewhere.

Hauturu is frequently described as the most intact native ecosystem in the country. The list of its natural assets is long: a plant, moss, liverwort, lichen and fungal community of more than 1700 species in a landscape where two-thirds of the forest cover has never been logged or touched by introduced browsers such as possums (*Trichosurus vulpecula*) or deer (order Artiodactyla); the most diverse native bird community in the country (51 breeding species), including endangered species found nowhere else, and a massive seabird population offering a seamless ecological link between the sea and the land through tonnes of marine-derived nutrients; the most diverse assemblage of native reptiles in the country with 14 known breeding species; and a diverse invertebrate fauna for which many species are yet to be described. From a research perspective this combination of size, elevation, type and extent of forest cover provides the only opportunity to study many of the interactions between plants, invertebrates, reptiles, birds and bats that were once a feature of mainland forests — a vital ecological baseline for New Zealand's natural environment and what it can be, in the face of the continuing decline of our natural world beyond the island's shores.

This natural gem could easily have been lost but for the whims of fate. The story of Hauturu is not just of its impressive wildlife, but of people: men and women who have lived a remote and isolated life protecting the island, researchers working in the challenging terrain to understand its flora and fauna, and conservation innovators bringing new techniques to eradicate the introduced pests in efforts that have inspired the conservation world. Auckland Museum was instrumental in petitioning the government to gazette Hauturu as a nature reserve in 1895 — an action that saved much of its natural biodiversity from human exploitation, but led to the eviction of the mana whenua, Ngāti Manuhiri, in an act that caused lasting pain and deprivation. Today, however, Hauturu is being managed in a spirit of partnership between Māori and Pākehā. After their settlement with the government under the Treaty of Waitangi claims process, Ngāti Manuhiri gifted most of Hauturu to the people of New Zealand, and they are now moving forward in the spirit of co-management with the Department of Conservation, charting new ways for conservation in New Zealand.

It is the purpose of this book to outline the stories of these people and the rich biodiversity of Hauturu. In 1961 Dr W. M. Hamilton and co-authors published the only comprehensive account of the human and natural history of Hauturu. That publication was the benchmark by the standards of the day. But there has since been an explosion of knowledge on the biodiversity of Hauturu and an additional 50 years of human history surrounding the island that is still undocumented in one source.

Hamilton and his colleagues would no doubt be shocked and delighted with progress in the understanding of Hauturu, and ability to manage and protect it. We live in a world where access to remote Hauturu is so much easier, where damaging pests can be removed on a massive scale, and where native animals can be introduced successfully and monitored remotely using new technologies. These capabilities bring added

responsibilities and an array of problems and questions regarding the management of Hauturu. How do we protect this ark from invasion by old enemies such as rats and weeds, or new ones such as kauri dieback? How do we decide the right path for ongoing restoration of the island and navigate the inevitable value judgements that are made when deciding what species to reintroduce and for what reason? How do we study the ecological changes we set in motion through our powerful conservation management actions? And what will be the consequence of these changes to the island that others may document in another 50 years?

This book seeks to address these questions while documenting the accumulated knowledge and history of Hauturu in the almost 60 years since Hamilton's book was published. It is written by experts in a range of fields, from human history to the biology of organisms both large and small.

Chapter three
Island life

— LYN WADE AND DICK VEITCH

Before the government began any conservation action for Te Hauturu-o-Toi/Little Barrier Island, the island was visited by people with the intention of seeing, recording, collecting or killing whatever they could find. Some were successful and put specimens of plants and animals into museums and private collections, or published papers recording their findings. Others failed.

Thomas Kirk, a botanist, visited in 1867 and recorded his observations in the *Transactions of the New Zealand Institute*. He made subsequent visits in 1871 and 1886, and plants that he collected are in Auckland Museum and the Museum of New Zealand Te Papa Tongarewa. Captain F. W. Hutton spent four days on the eastern side of the island in 1868, and supplied a list of birds he recorded there to the New Zealand Institute. He recorded that tīeke/saddlebacks (*Philesturnus carunculatus*) and kākā (*Nestor meridionales*) were very common. He noted the presence of New Zealand falcon (*Falco novaeseelandiae*), and a bird he did not know that came out at dusk and had a laughing call, rounded wingtips and was slightly larger than a morepork or ruru; this was probably whēkau (laughing owl, *Sceloglaux albifacies*). The other 15 forest birds he recorded are all still present on the island.

Austrian naturalist and collector Andreas Reischek may have spent more time than others on the island — he visited five times between October 1880 and December 1883 with the prime aim of collecting hihi or stitchbirds (*Notiomystis cincta*). During some visits he failed to see any hihi but he collected other birds and wrote about them in *Transactions of the New Zealand Institute*. In a letter to the surveyor-general on 17 October 1895, New Zealand naturalist and author Walter Buller recorded that he had purchased a dozen stitchbird skins in Auckland and that these were birds collected by Reischek. He noted that Lord Rothschild, a British zoologist, had 80 to 90 stitchbird skins for his natural history collection. Reischek recommended to the institute that the island be preserved to protect the birdlife. He suggested that one man would be able to oversee the whole island and that the habitat was suitable for many species. His bird list included kiwi, which had been notably absent from previous records. He commented that there were no bees on the island as Tenetahi, one of the Māori owners of the island, would not allow beehives to be brought ashore as he feared they would interfere with the nectar-feeding birds. Reischek said he could not recommend a more favourable place to benefit science and agriculture.

There are a number of records of the condition of the island at this time. Te Maraeroa, the traditional area of occupation and plantation on the southwest portion of the island,

Above: Te Maraeroa, 1893 (ATL, 20408). *Below*: Te Maraeroa, 2019. (CRV) *Previous*: House and surrounds, from the hill at the back looking south, 1901. (FS)

was grass and scrub. The hill slopes immediately behind were grass with some kānuka beginning to grow and some patches of pōhutukawa. This area was obviously being grazed by sheep and cattle and those animals would have returned to the flat for water. In summer there would have been little or no water in the streams.

Hugh Boscawen of the Department of Lands and Survey wrote in 1893 of the 'bush cattle' on the island: 'There is hardly a place they will not go, and they break and tear at supplejacks and other undergrowth for feed.' However, Reischek makes no mention of wild cattle. Rahui Te Kiri told the Native Land Court in 1895 that there were 1000 sheep and 30 head of cattle on the island at that time. Hamilton and Atkinson recorded that most of these were grazed on the southern side of the island,[1] but some — as reported by a stock transporter to the caretaker in 1893 — were grazing on the flat-topped planeze above Ngatamahine Point. It is extremely difficult for people to get to that planeze above Ngatamahine, and the report to the caretaker may have been just a story to satisfy his curiosity. Hamilton and Atkinson record that a considerable part of the forest on the southwestern side of the island and on the northern point was felled for firewood — but if that was so, how was the wood transported to the sea and onto a ship to Auckland? They then suggest that these areas were grazed. Undoubtedly the southern, western and northern planezes were burnt at some time, but access to large parts of this area is very difficult for humans, and even more so for sheep and cattle. Besides, there is no water there for stock. The firewood must have been taken from the slopes adjacent to Te Maraeroa.

No records have been found of how many kauri were felled and taken off the island. After the government had purchased some shares in the island it began putting the government brand on logs. There are kauri stumps on the ridge between the Tirikakawa and Awaroa streams, which matches reports that there were teams of oxen up these streams, although just one team is a more likely scenario. The impact of taking trees out of this forest may have been difficult to discern from the sea. Kauri stumps are also found at the clifftop just south of Pōhutukawa Flat in the northeast of the island where, presumably, the logs were rolled over the edge to crash onto the rocks below.

From this point the information in this chapter relies on diaries kept by the caretakers, their monthly reports and occasional other information now lodged in museums and archives. None of this is a consistent record. Some periods have no records; some are dependent on the interests of the writer and visitors staying on the island.

The first recorded conservation action was an injunction, declared in 1892, to stop kauri logging. Henry Wright was sent to the island as temporary ranger in 1892 to ensure that the injunction was observed. He recorded that there were eight men up the Waipawa Stream felling kauri. About this time Boscawen provided the Department of Lands and Survey with a report on the island supporting its suitability as a bird preserve because, as the terrain was so rugged, it was not suited to much else. Charles Robinson of the Department of Agriculture followed this up in February 1893 with a report to the

Clockwise from top: Two tents were used as an additional bedroom and the school room. (FS) Tenetahi's boatshed, 1 February 1893. (ATL, 20511) Tenetahi's house. (FS) Launching the Shakespear family's whaleboat, the *Bolivar*, 1900. (FS)

Department of Lands and Survey that during his tenure, Tenetahi or his representatives had provided a monthly boat service to Omaha. In December 1895, Kiri Tenetahi, son of Rahui and Tenetahi, made a sworn statement that he had seen a stitchbird skin in Robinson's hut. The Minister of Survey and Land then requested that Robinson be given one month's notice.

Following pressure to set aside the island to preserve some of New Zealand's rarer birds, the Little Barrier Island Purchase Act of 1894 was passed. Under the Act, Hauturu was deemed to be crown land. It was declared a reserve for 'preservation of native fauna' on 26 September 1895. Before this there had been decades of dispute, agreements to sell, refusal to sell, court orders, threats of eviction and, finally, an order for possession in November 1895. Following that, the government arranged on more than one occasion for a Crown Law officer, a bailiff, members of the police and the permanent militia, and an interpreter to visit the island and remove residents. Three of the militia men and Robinson remained on the island.

Tenetahi left behind 15 cattle, 70 sheep, many pigs, fowl and turkeys as well as his crops of maize, kūmara and potatoes. He later removed some of the stock and the remainder was taken off by a contractor to the Department of Lands and Survey and sold in Auckland. Robinson left the island on 25 March 1896 and two of the defence men remained.

It was agreed that management of the island was best overseen by the Auckland Institute and Museum. The government granted £200 to cover the expense of management for one year: the museum was to appoint a resident curator; the government steamer that serviced the lighthouses would be used to land stores; and a sum of £250 was granted to build a house for the caretaker. There were 198 applicants for the caretaker position. Robert H. A. Shakespear was appointed, and £150 of the £200 allocated was used for his salary.

In preparation for his tenure, Shakespear and members of his family visited the island on 30 December 1896 along with the museum president, Mr Donald Petrie, and a number of Auckland Institute people. They discovered that the four-room cottage built earlier by Simon Welton Browne, a timber trader, where they had intended to house the Shakespear family, had been removed. Two others were still standing but were not in good condition. The hut occupied by the previous caretaker, Mr Turner (the one remaining militia man), was deserted and the government boat was missing.

Robert Shakespear and his family left their farm at Whangaparāoa and landed on the island from the SS *Kawau* on 19 January 1897 — and there has been a caretaker in almost constant residence on the island ever since. The family would have comprised parents Robert and Blanche, and their children Frances, Robert, Ivy, Ruby, Ethel and Helen, aged between nine and 18. A sixth daughter, Katherine, was born in February 1898. A letter she wrote in 1980 states that two aunts arrived on the island with the family — these would have been Edith Smith, sister of Blanche, and Aunt Alice or Auntie Bolt, who are both referred to in later diaries.

Some members of the family spent their first night on the island in the boatshed built by Tenetahi at the mouth of Te Waikohare Stream; there was rain in the night and the shed 'leaked like a sieve'. They also pitched a tent, which stayed dry. The next day they shifted

into Tenetahi's house but continued to live in tents for the next 10 months, using the house as kitchen and living room.

They used a winch they had brought with them to haul their boat onto the beach. They brought a horse and some heifers — and probably some sheep, as other records state that stock owned by Tenetahi had been removed, yet 'the boys' went out to shoot a sheep on 25 January.

The oldest daughter, Frances, created a photographic record of the Shakespears' tenure on the island. She was a self-taught photographer, using a quarter-plate camera. Her entire photo collection has been preserved and many of the albums she created are still with family members.

On 16 February 1897 the family made a circumnavigation of the island in their only boat, the *Bolivar* — a whaleboat about 5 metres long. The diary records that they returned home at 6.10 pm 'after pulling for 6 hours'. There were later occasions when they went out and rowed around the island, but not all were successful — on one occasion a southerly wind rose as they headed south from Pōhutukawa Flat and they hauled the boat ashore at East Cape and walked home. From time to time the family and friends would picnic on a beach well away from home, and some of these outings would have required either two boats or multiple trips to get everyone there.

The house was built between June and August 1897 by F. Horneman and A. J. McCleod, who were paid for 58 days' work. The main part of the building was seven rooms, with kitchen and scullery as a lean-to addition at the back. The overall area of the house was 54' x 28'6" (approximately 16.5 x 9 metres).

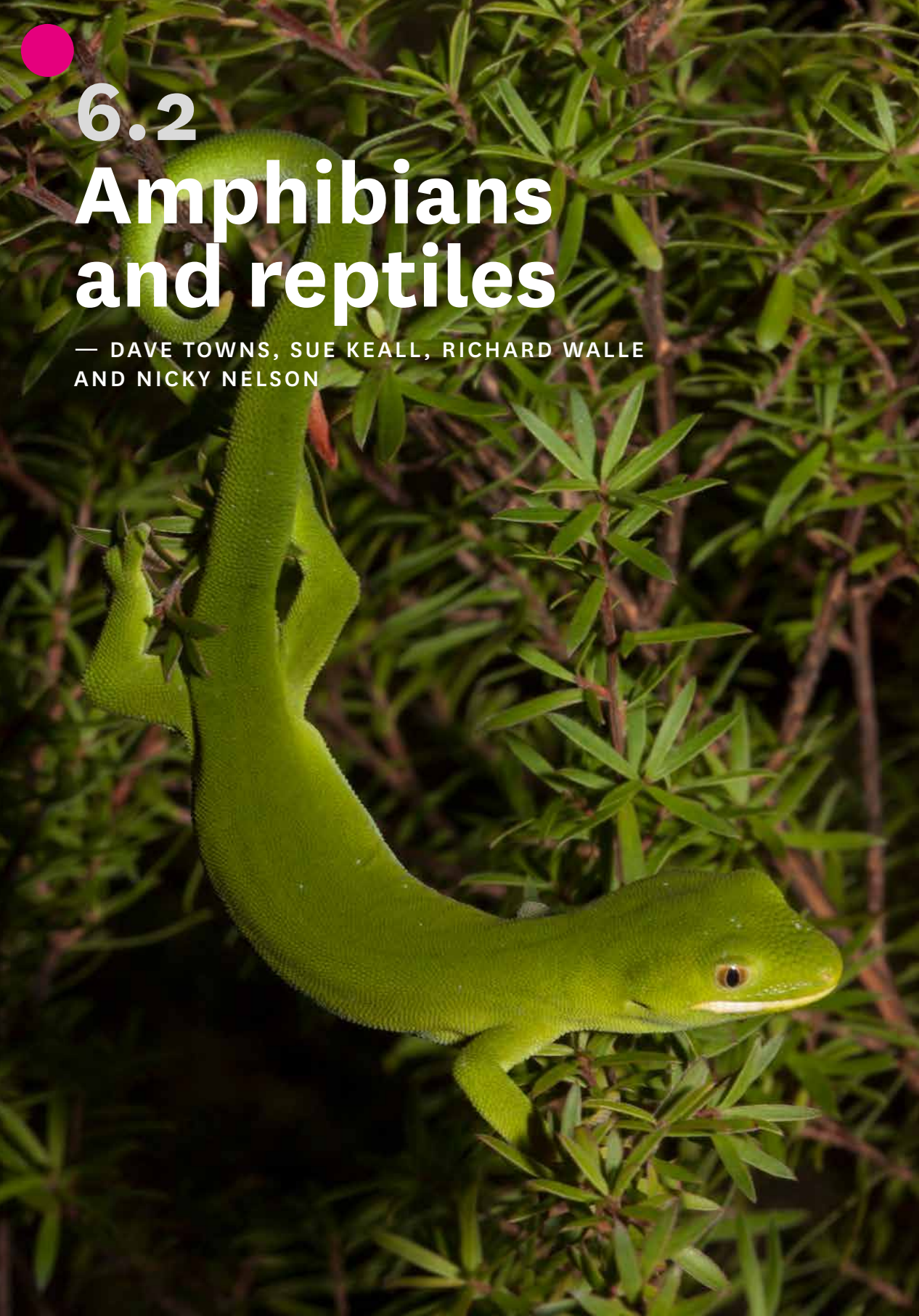
An entry in the caretaker's diary of January 1898 talks of the shortage of supplies: it was two months since they had had any meat to eat, and they had trouble catching fish. They must have purchased more sheep but by March of that year they had only five. Apparently the family were busy exploring the island by whaleboat and on foot. The diary also noted the presence of kiwi.

ISLAND LIFE FOR THE FAMILY may have been little different to that of a mainland farming family. The diaries show that their lives were ordered, with laundry every Monday and ironing every Tuesday; sewing was on Tuesday and could extend to Wednesday. The children were home-schooled with Auntie (Edith Smith) as teacher. Lessons were every morning, at least. Frances, in her diary, recorded that she joined the classes on Wednesday and Friday mornings to learn specific subjects. Afternoons were free, with frequent walks over the flat, along tracks, or outings in the boat. Frances and Auntie collected and preserved plants that are now in Auckland Museum. Visitors were infrequent for much of the year but some photos show the occasional gathering. For evening and wet-weather entertainment they had board games, a piano and an organ, and a number of family members played and sang. Almost every evening Frances records that she and Auntie read to each other from books and newspapers, or that they were 'toning photographs'.

They had cows to milk and sheep and cattle for meat. There was an extensive vegetable garden. Pat, an employee from Great Barrier Island, and later Blakie, then Jimmie and Mrs

6.2 Amphibians and reptiles

— DAVE TOWNS, SUE KEALL, RICHARD WALLE AND NICKY NELSON



Here we provide the first comprehensive account of the herpetofauna (amphibians and reptiles) of Hauturu, using the benefits of modern and intensive systematic studies as well as surveys and long periods of monitoring. Tuatara and lizards have an intriguing conservation history on the island, and they now provide the closest approximation of the composition and habitat use of reptile faunas on the adjacent mainland before human contact.

When government scientists undertook their studies on Hauturu in the early 1960s the role of non-avian terrestrial vertebrates in the native fauna was poorly understood — so it is not surprising that although the bird fauna was comprehensively described in the resulting volume,[1] herpetofauna received only passing mention. In hindsight there were two reasons for this lack of coverage. First, the uniqueness of native frogs and tuatara had long been recognised, but taxonomy of the lizards was poorly developed and so confused by nomenclature problems and duplicated descriptions that even the more commonly found species were difficult to identify. The bulletin published in 1955 by Charles McCann of the Dominion Museum was the first comprehensive attempt at unravelling this taxonomic mess. But even with McCann's newly published volume in hand, there would have been few people in the country with the required expertise to use it. Perhaps it was a convenient outcome that the expeditions encountered few reptiles.

The second reason for the lack of coverage stemmed from the reasons behind these few reptile sightings. Kiore may have been on the island for a considerable period and feral cats for at least 70 years. More recent studies have shown that both species can have devastating effects on tuatara and lizard populations. Even after cats were removed in 1980, lizards were rarely encountered unless there were specific attempts to trap them. Until 1991, tuatara were presumed to have died out. The studies for the 1961 bulletin were thus undertaken when reptile numbers on Hauturu were heavily suppressed, and even if lizards were found, their identity would have been difficult to determine.

Amphibians

So far, native frogs have not been found on Hauturu. However, herpetologists such as Tony Whitaker have pointed out that there is a great deal of potential frog habitat. A systematic search for Hochstetter's frog (*Leiopelma hochstetteri*) was carried out in January 2019,

Elegant gecko (*Naultinus elegans*) (DvW)

though not all streams were searched. There was no search for Archey's frog (*L. archeyi*). It would be premature to assume total absence of either of these species but it seems likely that, if they did occur naturally on Hauturu, they were eaten by kiore.

Reptiles

Tuatara

Historic records of tuatara on Hauturu are rare. Their significance as a taonga species for Ngāti Manuhiri and Ngāti Wai is evident and the importance of the island is intertwined with its special fauna, but stories of tuatara on Hauturu and the memories of tuatara from kaumātua are scarce.[2] By the time Europeans recorded observations of tuatara on Hauturu they are likely to have already been only small in number and/or difficult to detect because of the predatory and competitive impacts of kiore. The later introduction of cats added another predator, and the negative effects of occupation and logging would have caused disturbance, particularly of lowland habitat. By the early 1900s tuatara sightings were rare, only single large individuals, and by 1977 it was suspected they had been lost from the island.[3]

Reischek, in 1886, described tuatara as different in appearance to those on other islands, and this resulted in their consideration as a subspecies of tuatara: *Sphenodon punctatus reischeki*.[4] Surveys of all tuatara islands in the early 1990s targeted Hauturu in particular, with the aim of establishing whether tuatara with perceived special differences from other populations still existed there. Eight adults were captured during two large surveys. Blood samples from these individuals recognised that Hauturu tuatara are part of a genetic stock of tuatara on islands off the east coast of the North Island that are somewhat different from tuatara on islands in Cook Strait. However, although island-specific differences are apparent — likely due to the extent of time those islands have been separated from the mainland — all tuatara populations, including those on Hauturu, are best described as one species, *Sphenodon punctatus*, with important geographic variation across the distribution of tuatara populations.[5]

The eight individuals captured on Hauturu were four adult males and four adult females. Members of the search teams were convinced there were likely more tuatara on the large island and, indeed, there were a handful of records of further observations in subsequent years. However, it was the legacy of the eight captured adults that formed the basis for the recovery of tuatara on Hauturu. These adults formed the foundation of a captive breeding stock held on Hauturu, secure from kiore predation. Genetic analysis supported the idea of a relatively recently reduced population, in that these tuatara were genetically diverse rather than inbred, and showed similar levels of genetic diversity to tuatara on Takapourewa/Stephens Island in Cook Strait[6] — an excellent start for re-establishing a thriving population of tuatara on Hauturu.

Captive housing on the island allowed researchers to observe and interact with the adults. Egg induction from gravid females was attempted and eggs deposited in nests were excavated to acquire eggs for artificial incubation at Victoria University of Wellington. Artificial incubation of eggs was used as a technique to increase productivity through

Tuatara (*Sphenodon punctatus*) (RG)

Forest gecko (*Mokopirirakau granulatus*) (DvW)

Duvaucel's gecko (*Hoplodactylus duvaucelii*) (DvW)

Pacific gecko (*Dactylocnemis pacificus*) (DvW)

Raukawa gecko (*Woodworthia maculata*) (DvW)

greater hatching success (in 1996 Thompson et al. found that half of eggs can fail in natural nests from environmental causes).[7] By 2018, approximately 290 offspring from incubated eggs had been returned to Hauturu to be raised there.[8]

All tuatara were kept in captivity on Hauturu until kiore were eradicated. This involved enormous dedication from the island team, volunteers and sponsors, as tuatara were given supplementary feed, and the young were raised in small enclosures to reduce the incidence of predation by older, larger tuatara and to minimise the effects of drought and predation. From the first successful hatching of eggs in 1994 and throughout the following 25 years, offspring were housed in ever-expanding captive facilities on the island.

Research was conducted on the Hauturu tuatara to investigate whether the sex-determining pattern for northern tuatara differed from Cook Strait tuatara, where incubation temperatures above 21.6°C produced more male hatchlings and, below that, more females. Laparoscopies were carried out on juveniles from eggs incubated at different temperatures to evaluate the sex ratio of young produced, and future incubations were managed for an even sex ratio.[9] Paternity was evaluated to understand the representation of genetic diversity from founders in the next generation offspring.[10] One male had sired 78 per cent of hatchlings, so he was removed from breeding opportunities and later released at his original capture site to allow better representation of all four males. One male failed to sire any offspring, even with sole access to females, so his genetic legacy was not captured in following generations of Hauturu tuatara. In some cases maternity was also confirmed using genetic tools, especially where nests had been excavated without good knowledge of which female had built the nest. Female and male tuatara were both observed to be polygamous, with multiple mates — sometimes within the same breeding season.[11]

The conservation of tuatara was one reason why Ngāti Manuhiri decided to support eradication of kiore — removing kiore from the island increased the chances of securing a healthy, sustainable population of tuatara and other native species on Hauturu. From 2006, when the island was declared kiore-free, captive-raised juveniles were released in clusters around the island at locations where adult tuatara had been either captured on the original surveys or seen since; for example researchers and island managers had seen two additional adult males after the 1991 and 1992 surveys. Six release areas received juveniles, subadults and ultimately the original adults from the breeding stock.

In 2015 a survey was conducted to evaluate the population of tuatara on Hauturu. It was held 11 years after the kiore eradication had taken place, and included regions of the island where the first eight tuatara were captured during the rediscovery in 1991 and 1992; where tuatara had been subsequently sighted; and release locations for artificially incubated, captive-raised juveniles. The goals were to evaluate how released tuatara were doing, and whether further tuatara could be located that represented stock that had survived through the kiore habitation and eradication, or that provided evidence for recruitment in the wild subsequent to the kiore eradication. Data from tuatara at release sites demonstrated they are healthy and growing. Four unidentified tuatara were located, providing evidence for successful recruitment in the wild, and that there are likely tuatara that exist on the island that were not observed during earlier surveys.

The tuatara housing facilities on the island were opened up in 2017 to allow the

remaining captive tuatara to make their own way out of the enclosures and establish territories around the adjacent area — although most of the adults have stayed in their burrows after the fence was removed. Visitors to the island may now be lucky enough to see the fruits of the labour of many dedicated people and organisations; that is, they now have the opportunity to observe tuatara in the wild on Hauturu, as the beginning of a long comeback towards a self-sustaining population.

Lizards

There was little systematic surveying for lizards until three surveys led by Tony Whitaker in the early to mid-1990s. The first of these aimed at determining the status of tuatara. However, the focus of the surveys changed after the incidental discovery of a chevron skink (*Oligosoma homalonotum*), a species known previously only from Aotea/Great Barrier Island. The island was then extensively searched for chevron skinks. Arrays of pitfall traps were installed in 1993 in habitats similar to those where chevron skinks had been encountered on Aotea, as well as in coastal sites near Te Maraeroa (1990) and in ridge sites and other valley sites (2000–2005). The pitfall trap monitoring has provided a useful basis for determining lizard habitat use and changes in abundance over time. In addition, the traps captured a previously unknown species from the island, the striped skink (*O. striatum*), at a heavily forested site.

The list of 14 confirmed species on Hauturu (see Chapter 9, species list) is the largest for any offshore island and equals the number of species on Aotea. The highest diversity within any of the habitats monitored is in the rocky coastal sites near the settlement, with four species of skinks and one species of gecko (Table 1). Only copper skinks (*Oligosoma aeneum*) and ornate skinks (*O. ornatum*) were found outside these coastal habitats.

Table 1. Distribution of lizard species

Distribution of five widespread lizard species in a range of habitat types on Hauturu, following monitoring by Keri Neilson and Rosalie Stamp in the period leading up to and immediately after the eradication of kiore. Presence is indicated as a shaded box.

Species	Coastal bare rock–low scrub	Stream base in coastal forest	Stream terrace in coastal forest	Ridges with kānuka cover
Copper skink	■	■	■	■
Ornate skink	■			■
Shore skink	■			
Hauraki skink	■			
Raukawa gecko	■			

6.3 Birds

— TIM LOVEGROVE, MATT RAYNER AND KEVIN PARKER

In the late nineteenth century, New Zealand naturalist Sir Walter Buller was one of a number of observers acutely aware that many New Zealand forest birds were in decline, including bellbird/korimako (*Anthornis melanura*), robin/toutouwai (*Petroica longipes*) and whitehead/pōpokotea (*Mohoua albicilla*).[1]

Buller highlighted the value of islands such as Hauturu and Kāpiti where these species were still common. While habitat loss through forest clearing was an important factor, Buller, Reischek and others also blamed the introduction of carnivorous mammals for the decline of many native birds on the mainland.[2] From the 1880s Hauturu was recognised as especially important because it was the only place where the hihi/stitchbird (*Notiomystis cincta*) still survived.[3] Hauturu has some of the best examples of natural ecosystems in New Zealand and, as one of our most important sanctuaries, harbours a high proportion of the North Island's extant indigenous forest birds. The forest avifauna has recently been enhanced through translocations of kākāpō (*Strigops habroptilus*), kōkako (*Callaeas wilsoni*) and tīeke/saddleback (*Philesturnus rufusater*). In recent years Hauturu has also been an important source of birds to found new populations on a number of restored Hauraki Gulf islands and pest-managed sanctuaries elsewhere in the North Island.

What would have been the composition of Hauturu's birdlife when Māori first arrived? Using Medway's example of Stephens Island, Hauturu might have still supported now-extinct small rails (*Capellirallus karamu* and *Gallinula hodgenorum*), flightless wrens (*Pachyplichas jagmi* and *Traversia lyalli*), bush wren (*Xenicus longipes*), kōkako and piopio (*Turnagra tanagra*).[4] The survival of North Island snipe (*Coenocorypha barriensis*) on Hauturu into the mid-nineteenth century provides a tantalising glimpse of what the island's full complement of birds might have been. Some of these species, especially the small rails and flightless wrens, could have been wiped from the island by kiore or Pacific rats (*Rattus exulans*). Snipe were clearly already very scarce by the mid-nineteenth century. Could huia (*Heteralocha acutirostris*) also have been present, but hunted to extinction during the early Māori era? What about piopio? Surely piopio, if it was present, should have survived into the European era on Hauturu as it did on Stephens Island and the mainland.[5] Was piopio naturally absent from Hauturu for some reason? Why, too, did kōkako not occur on Hauturu as it did on nearby Aotea?

Turbott discussed those species such as weka (*Gallirallus australis*) and kōkako that were never historically recorded on Hauturu, and compared the avifauna of Hauturu with Taranga/Hen and the Poor Knights islands.[6] The smaller islands have lower land-bird diversity: Taranga, for example, lacks the rifleman (*Acanthisitta chloris*), robin and

Stitchbird/hihi, male (*Notiomystis cincta*) (LWh)

whitehead, while the Poor Knights lack a much wider range of species. The missing species reflect the smaller size and altitudinal range — and, thus, more limited diversity of forest habitats — on Taranga and the Poor Knights compared with Hauturu. Importantly, during the period when Māori dwelt on Taranga and the Poor Knights a much greater proportion of the forest was burned or cleared.[7] Māori cleared parts of Hauturu, but a very large area of the inland forest was never cleared. On Taranga and the Poor Knights, however, forest clearance would have greatly reduced the available habitat for some species. Those that persisted were species where viable populations could persist in small habitat patches, for example bellbird, rironiro/grey warbler (*Gerygone igata*), pīwakawaka/fantail (*Rhipidura fuliginosa*) and tīeke; those that could survive in open country, such as red-crowned kākāriki (*Cyanoramphus novaezelandiae*); or mobile species that could recolonise, such as kererū (*Hemiphaga novaeseelandiae*), kākā (*Nestor meridionalis*), kākāriki (*Cyanoramphus* spp.), fantail, tomtit/miromiro (*Petroica macrocephala*), bellbird and tūī (*Prosthemadera novaeseelandiae*).

A number of studies have been carried out to determine the abundance of various bird species on Hauturu, and to measure changes in bird populations over the period since feral cats and later kiore were eradicated. Some of the results from these are included in the species accounts that follow.

Seabirds

The Hauraki Gulf is a global centre of seabird biodiversity and seabirds play a huge role in Hauturu's ecology.[8] Although only a few seabird species breed on the island, they are dominant in terms of their biomass and impacts on the ecosystem. Studies over the past 20 years on New Zealand's northern offshore islands, including Hauturu, show that seabirds are important ecosystem engineers. Their burrowing tills the soil and improves its structure; they improve plant growth by depositing marine-derived nitrogen and phosphorus as guano, dead adults, eggs and chicks, thus increasing the abundance of terrestrial invertebrates;[9] and they increase the productivity of nearshore rocky reef habitats through runoff from the land. Hauturu, with its largely intact ecosystems and enormous seabird populations, is a microcosm of mainland New Zealand before humans arrived.

Of the seabird species recorded breeding on Hauturu, it is the tubenoses or Procellariiformes that have the greatest ecosystem impact. Cook's petrel/tītī (*Pterodroma cookii*), black petrel/tāiko (*Procellaria parkinsoni*) and grey-faced petrel/ōi (*Pterodroma gouldi*) are medium to large burrowing petrels that breed in the forest from the lower slopes to the summit ridges. All three species are still recovering after feral cats and kiore were eradicated from Hauturu, and their growing populations are having a profound influence on the ecological trajectory of the island. For example, it is estimated that the rapidly increasing population of Cook's petrels alone contributes approximately 50 tonnes of nutrients annually to the island's forest ecosystems.

The extended footprint of Hauturu's seabirds is important, too. Recent studies using advanced tracking technologies have confirmed migration routes to far-flung regions of the

northern and eastern Pacific, up to 10,000 kilometres away.[10] Rebounding populations of migrant Cook's and black petrels from Hauturu are playing an increasing ecological role as top predators in marine ecosystems far from New Zealand.

Cook's petrel/tītī (*Pterodroma cookii*)

Summer nights on Hauturu are dominated by the din of Cook's petrels returning to their burrows on the higher slopes. This medium-sized (c. 200 grams) endemic petrel is probably the island's most numerous vertebrate. There are two populations of Cook's petrels breeding at either end of New Zealand — on Hauturu and on Whenua Hou/Codfish Island. The populations are genetically and behaviourally distinct and represent two reproductively isolated subspecies.[11] Tracking studies have shown that during breeding, Cook's petrels from Hauturu forage east and west of the North Island. They frequently cross the mainland north of Auckland to reach the Tasman Sea, and on summer evenings the *kek-kek-kek* calls of returning Cook's petrels are a familiar sound over Rodney district in the so-called North Auckland Seabird Flyway, which is probably also used by black and grey-faced petrels.[12] Cook's petrels from Hauturu may travel several thousand kilometres from home but have little overlap at sea with the Codfish Island subspecies.[13]

Beginning in March, Cook's petrels make an enormous trans-Pacific migration from Hauturu totalling over 40,000 kilometres. Over about 35 days they first fly east then north, crossing the equator to overwinter in the North Pacific convergence zone, which encompasses the waters from about 1000 kilometres north of Hawai'i across to the coast of California and Mexico.[14] The return trip occurs over about 20 days in September.

Hauturu has the world's largest population of Cook's petrels. Originally they were estimated to number around 50,000 breeding pairs.[15] Surveys across the island in 2005 showed they were widespread on all forested ridgetops and slopes that had escaped historic burning and deforestation;[16] it was estimated there were about 286,000 breeding pairs, with a total population of over 1.2 million birds.[17] Since 2005 it is estimated that the breeding population has increased to c. 400,000 pairs. We now see many more freshly dug Cook's petrel burrows; the nocturnal arrival of birds over Hauturu is much noisier than before; increased numbers are heard at night over Auckland and the Rodney district; and observers of pelagic birds in the North Pacific Ocean are reporting larger numbers.

The high rate of losses of Cook's and black petrels to feral cats in the 1940s and 1950s was one of the main drivers of the programme to eradicate feral cats from Hauturu in the 1970s.[18] Mike Imber and Matt Rayner studied the birds' breeding biology over a 35-year period between 1972 and 2007; importantly, their studies covered both the feral cat (1980) and kiore (2004) eradications on Hauturu. Counterintuitively, breeding success declined following cat eradication because of the ecological release of kiore, which were also predators of Cook's petrel eggs and chicks. The benefits of removing kiore were clearly shown when breeding success rebounded in 2004 after the rats were gone.[19]

Grey-faced petrel/ōi (*Pterodroma gouldi*)

Grey-faced petrels are common, large (550 grams), burrowing seabirds on New Zealand's northern offshore islands and on some mainland headlands.[20] Historically they were very abundant on Hauturu, where they burrowed in soft soils along the coastal clifftops.[21] These

Cook's petrel/tītī (*Pterodroma cookii*) (EW)

Black petrel/tāiko (*Procellaria parkinsoni*) (EW)

Grey-faced petrel/ōi (Pterodroma gouldi) (JP)

Fluttering shearwater/pakahā (*Puffinus gavia*) (NF)

New Zealand storm petrel (*Fregetta maoriana*) (NF)

Common diving petrel/kuaka (*Pelecanoides urinatrix*) (NF)

winter-breeding petrels were easy prey for feral cats, and Sibson, Turbott and McKenzie all described the severe impacts of cat predation on adult and fledgling birds.[22] Given the level of predation, it is likely that grey-faced petrels were nearly locally extinct on Hauturu by the time the last cat was removed in 1980; intensive searches in the 1970s and 1990s failed to find any breeding birds. Rayner et al. described the return of this species when they found seven active burrows and four chicks above sea cliffs east of Ōrau Cove in November 2009.[23] Since then the birds have recolonised former breeding sites on steep slopes above the mouths of the Waipawa and Haowhenua streams on the west coast of the island, and many have been heard at night over Pōhutukawa Flat on the east coast. At present, 100–300 pairs are believed to be breeding on Hauturu. A comprehensive survey of the island is needed to assess the size of the current population.

Black petrel/tāiko (*Procellaria parkinsoni*)

Black petrels were formerly widespread and abundant on mainland New Zealand, including the Auckland region, where they bred in the Waitākere Ranges. Today this large 700-gram endemic petrel breeds only on Aotea and Hauturu in the Hauraki Gulf. Mike Imber carried out the first comprehensive study of their breeding biology on Hauturu between 1971 and 1975.[24] Tracking studies show that breeding birds forage along the edge of the continental shelf and beyond in deeper oceanic waters,[25] and observations at sea show that they migrate to the tropical eastern Pacific Ocean during the non-breeding season.[26] As with Cook's petrel, studies of the black petrel were initiated by the New Zealand Wildlife Service in the 1970s following reports of mortality of fledglings as a result of cat predation on Hauturu.[27] After cats were removed in 1980, 249 black petrel chicks were transferred to Hauturu from Aotea between 1986 and 1990 (see Appendix 2). The goal of this project was to investigate the potential of translocating seabird populations and, although most of the birds transferred were subsequently recaptured on Aotea, this method has since been refined and become a mainstay of global efforts in seabird conservation.[28]

Between 2015 and 2017 a comprehensive population survey of black petrels on Hauturu was funded by the Ministry for Primary Industries and the Department of Conservation. This work was prompted by an observed 1.4 per cent annual decline of the Aotea population, and observations of high mortality in longline fisheries.[29] Extensive island-wide surveys using acoustic recorders, transects and dog surveys found that as with Cook's petrels, black petrels on Hauturu prefer to breed on or near the higher ridges, presumably to aid takeoff from the forest canopy. This population survey revised the estimate for black petrels breeding on Hauturu upwards from 100 pairs to 620 pairs.[30]

New Zealand storm petrel (*Fregetta maoriana*)

This tiny 35-gram storm petrel, known only from a few specimens collected off the New Zealand coast in the nineteenth century, was presumed extinct until it was rediscovered in 2003, when sighted by a bird-watch group off Whitianga.[31] However, it took another 10 years of intensive searching before Hauturu was identified as the only known breeding site.[32] After its rediscovery, initial work focused on developing a method to catch birds at sea, and to confirm its identity by comparing the DNA from blood samples of captured birds with museum specimens.[33]

Pied shag/kāruhiruhi (*Phalacrocorax varius*) (SF)

Black-backed gull/karoro (*Larus dominicanus*) (NF)

White-fronted tern/tara (*Sterna striata*) (NF)

North Island brown kiwi (*Apteryx mantelli*) (SF)

Brown teal/pāteke (*Anas chlorotis*) (LWh)

Little penguin/kororā (*Eudyptula minor*) (TL)

naturalist Ernst Dieffenbach that kiwi were present,[43] but later visitors, including Captain Wood, Sir George Grey and E. L. Layard, found none.[44] Captain Hutton, who had a dog with him when he visited the island, concluded that kiwi were either very rare or not present. In 1873 Buller wrote that T. Kirk had collected several kiwi on Hauturu, but those specimens have been lost.[45] The paucity of early records is probably not surprising as kiwi can be hard to find, especially when numbers are low, the search is only during the day, and the searcher has not previously observed kiwi sign. It is also possible that free-ranging dogs from the Te Maraeroa settlement had substantially reduced the population.

In his first week on the island in January 1897 Robert Shakespear wrote, 'I think I saw a kiwi.' In later diaries he records some kiwi sightings but the origin of those birds is unclear because, at the time, brown kiwi were being sent from various parts of New Zealand to 'populate the island'. The first recorded releases were two birds from an unknown location, sent by Thomas Cheeseman on 21 March 1898. There were further translocations, with departures from the mainland noted in newspapers but arrivals at the island not recorded, and vice versa. Other releases include two from New Plymouth before 1903; as well as a South Island brown kiwi 'presumably from Resolution Island',[46] an albino kiwi from the Taupō region in 1913 and a young male from Northland in 1931 (see Appendix 2).

There is at least one extant specimen that pre-dates the first release in 1898 — a brown kiwi that Reischek collected on Hauturu in 1882 and which is now in the Vienna State Museum. It is from this specimen that Ricardo Palma obtained a new species of louse, unique to Hauturu, which he named *Rallicola* (*Aptericola*) *rodericki*.[47] This finding has been confirmed by louse samples taken more recently from other Hauturu kiwi. Further evidence of brown kiwi being natural on the island was provided by Herbert and Daugherty, who found a unique haplotype in brown kiwi blood samples from Hauturu.[48] Brown kiwi on Hauturu today are a genetic mix of the original population and kiwi translocated from various parts of the mainland.

Brown kiwi are widespread and common on all parts of Hauturu from Te Maraeroa to the summit ridges. A kiwi call count survey in 2002 confirmed their widespread distribution. During the survey a rate of 24 calls per hour was recorded, and the population was estimated at 240–300 pairs, based on an average territory size of 10–12.5 hectares per pair.[49]

Great spotted kiwi (*Apteryx haastii*)

Nineteen great spotted kiwi were introduced to Hauturu from the Gouland Downs, northwest Nelson, in 1915.[50] The caretaker, Robert Nelson, reported that they had become established. Turbott notes that after a visit by R. A. Falla in 1928 when some feathers were found, there were no further sightings.[51] However, records from the rangers' diary suggest that this species may have persisted much longer: a nest and egg were found at the Waipawa Stream in November 1962, and there is a clear sighting by Gina Blanshard of a 'large spotted grey kiwi at side of Summit Track at 600ft' on 9 January 1964. There have been no further reports of this species on Hauturu.

Australian brown quail (*Coturnix ypsilophora*)

Reischek found brown quail on Hauturu,[52] and they were common at Te Maraeroa during

fruit of kawakawa, pūriri, nīkau, karaka, *Coprosma* spp., tawa, taraire, kohekohe and miro are important, while in winter and spring, foliage such as *Muehlenbeckia* forms an important part of their diet. Local movements may account for the higher numbers of kererū found on the high-altitude bird counts reported by Girardet et al.[64] Overall, during the transect bird counts between 1975 and 2017, kererū numbers did not change markedly.

Kākāpō (*Strigops habroptilus*)

Soon after kākāpō were rediscovered on Rakiura/Stewart Island in 1977, the small population of 100–200 birds was found to be declining quickly because of feral cat predation.[65] Using trained dogs, all of the surviving birds that could be located were rescued and transferred to Whenua Hou/Codfish Island, Maud Island and Hauturu. Only 62 kākāpō were found: 38 males and 24 females. At the time, both Hauturu and Whenua Hou had kiore, a potential threat to kākāpō nests. This was not the first time kākāpō had been released on Hauturu: four birds brought from Resolution Island were released on Hauturu in 1903, and others were released on Kāpiti Island.[66] The first kākāpō on Hauturu probably did not survive long in the presence of feral cats.

After the release of 21 Stewart Island and one Fiordland kākāpō on Hauturu, the birds were managed intensively and were provided with supplementary food including nuts and fruit and vegetables such as apple, carrot and kūmara. There was early optimism when males established track-and-bowl systems and began booming along the summit ridges and some females nested.[67] Two young males fledged successfully but some nests were preyed on by kiore, despite protective rings of rat traps placed around them.[68] When the decision was made to remove kiore from Hauturu using an aerial poison drop, all of the kākāpō that could be found were transferred back to the southern kākāpō island, Whenua Hou. A period followed between 1999 and 2012 when there were no kākāpō on Hauturu. In the meantime, there were successful breeding years in the south, coinciding with rimu mast years, and the population was slowly expanding. After the removal of kiore, kākāpō were translocated back to Hauturu from 2012 (see Appendix 2 and Appendix 3). The returning birds included some of those that had been there previously and, remarkably, some of them moved back into their old territories despite an absence of 13 or more years. Visitors to Hauturu are unlikely to see a kākāpō. They are more likely to see their characteristic feeding sign on sedges and other plants along the ridge tracks.

North Island kākā (*Nestor meridionalis*)

Hauturu, Aotea and the Hen and Chicken Islands are northern strongholds for kākā (photo on page 159), and between them the islands probably support a population of several thousand birds. The kākā is a conspicuous and noisy resident around the homestead and Te Maraeroa, and this was particularly so in the days when kākā were fed at the homestead. A radio-tagging study showed that kākā move quite freely between the islands, and every winter there is an outflow of young to the mainland with frequent sightings in suburban Auckland. Some disperse even more widely: a kākā banded by Terry Greene on Hauturu was recovered in Gisborne. The thriving Hauraki Gulf kākā population is an important source of founders to restored habitats on the mainland.

Banded rail/moho pererū (*Gallirallus philippensis*) (CRV)

Pūkeko (*Porphyrio melanotus*) (LWh)

Spotless crake/pūweto (*Porzana tabuensis*), on Aorangi Island, Poor Knights Islands (CM)

New Zealand pigeon/kererū (*Hemiphaga novaeseelandiae*) (LW)

Kākāpō (*Strigops habroptilis*) (AD)

Red-crowned kākāriki (*Cyanoramphus novaezelandiae*) (NF)

Yellow-crowned kākāriki (*Cyanoramphus auriceps*) (SF)