

Environmental News

Issue 44 | Winter 2021



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Aotea Great Barrier
ENVIRONMENTAL TRUST
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Editorial: First Impressions

BARRY SCOTT

***A**s the new Editor of Environmental News a little about myself. I recently retired from Massey University where I taught Molecular Genetics and carried out research on Plant-Microbe symbiosis. I am a Fellow of the Royal Society of New Zealand/Te Apārangi and was a founding Board Member of the Environmental Risk Management Authority. I have been actively involved in Conservation work in New Zealand for around 50 years, first in Dunedin, then in Palmerston North where Christine and I have resided since 1980. My main conservation activity in PN has been forest restoration and predator control of two PNCC reserves in Aokautere. After a visit to Aotea in 2016 we decided this would be a great location as a base for adventures with grandchildren to keep them connected with Nature. We settled for a property at Awana, which is an ideal spot for me to pursue my conservation interests post-retirement.*



Barry Scott on Awana Cliffs.

Cover: Tomtit. Photo: Biz Bell (Wildlife Management International)

Back cover: Dotterels. Photo: Owen Mills

What struck me most when I arrived at Awana in the summer of 2018 was the lack of birdsong. At our home in Aokautere we have magnificent birdsong with abundant tui, bellbird, kereru, ruru and many other native and introduced birds. At Awana there were a few fantails and grey warblers, and tui when the pōhutukawa or flax were flowering, the occasional squawk of a kākā overhead and the ubiquitous pūkeko in the paddock below, but during the day it was mostly silent. One consolation was seeing for the first time banded rails around the house, dotterels on the beach and pāteke on the nearby estuary. My biggest shock was to discover that bellbird

were extinct on Aotea Great Barrier, which along with kōkako and several other birds were abundant 50-100

years ago. The reason for the lack of birdsong became apparent when I started trapping rats around Awana – never have I seen so many rats not to mention the feral cats.

But the community is fighting back to restore the birdsong. The landscape level predator control being carried out at the Windy Hill sanctuary across an area of ~800 Ha is impressive. Predator numbers are also kept low in Glenfern sanctuary, helped by the presence of the predator proof fence across the peninsula. But it is the groundswell support for restoration and protection of the environment at a community level in Tryphena, Oruawhero, Okupu, Awana and Okiwi and the island wide advocacy by Aotea Ecology Vision that is the most heartening. Those involved in these projects came together in November 2020 to participate in the Aotea Conservation Workshop to review achievements for 2020 and arrive at a list of top five priorities for collaboration in 2021. This was a great opportunity to meet the individuals involved in

these projects and to share the collective enthusiasm for protecting the biodiversity of the island. But what is the way forward for an island that is 28,500 Ha in area? That became apparent at the Ecology Vision Festival held in April of this year. What a great lineup of presenters from Auckland Council, Predator Free 2050, The Cacophony Project, Predator Free Rakiura, Project Island Song in the Bay of Islands and the recently announced Tū Mai Taonga. I think most of the around 80 participants came away from this workshop with a strong sense of optimism for the future of Aotea.

Tiakina ngā manu, ka or ate ngahere
Look after the birds and the forest flourishes
Ka or ate ngahere, ka ora ngā manu
If the forest flourishes, the birds flourish¹

This shared purpose/kaupapa to restore the biodiversity of Aotea underpins Tū Mai Taonga, which has recently

received up to \$3 m from Predator Free 2050. Tū Mai Taonga can be translated as standing up for our precious treasures. It represents our collective vision of “Te Oranga o te Ngahere”, a healthy forest and ecosystem. Kate Waterhouse, chair of GBI Environmental Trust and a Trustee on Tū Mai Taonga provides more detail on this exciting project in this issue.

No one shared this vision for Aotea more passionately than Emma Waterhouse, former GBIET trustee and editor of this newsletter, who sadly died in March of this year. She very much wanted to be part of Tū Mai Taonga and the pathway leading toward a predator free Aotea. It is fitting to reflect on Emma’s accomplishments and share tributes to Emma from her friends and family in this issue. Emma’s presence and impact on Aotea will be sorely missed.

As the new editor of the GBIET newsletter I have tried to meet the exacting and high standards Emma previously set.

¹Sourced from *Maori values and native forest (Ngahere)* by Harsworth et al. Manaki Whenua Landcare Research

Cuvier/Repanga Island Nature Reserve

BARRY SCOTT with ROB CHAPPELL

Cuvier Island, located off the eastern entrance to Colville Channel at the tip of the Coromandel, had a long history of human-induced disturbance but since becoming completely predator and livestock free in 1993 it has become home to many of New Zealand's endangered wildlife. Rob Chappell from the township of Coromandel has played a key role in the restoration of this island and shares with us some of the history and background to that recovery process.

Introduction

Cuvier/Repanga Island Nature Reserve is the most remote, and second largest (195 Ha) of the predator free offshore islands in the Mercury Island Ecological District. Repanga has special significance for Māori who used the island as a base for catching seabirds and kai moana. The name Cuvier, after Baron Cuvier, was assigned by the explorer D'Urville who passed by the island in 1827. While there is no evidence of pa on the island, archaeological evidence such as midden sites, indicates a long

history of Māori presence on the island. Several Hauraki iwi including Ngāti Hei and Ngāti Whaunaunga claim manawhenua over Repanga Island. With the establishment of a lighthouse on the island in 1889, light house keepers and their families settled on the island and stayed from this time through till 1982. Despite its distance from the mainland, the island has had a long history of human-induced disturbance that started with fires and introduction of kiore in pre-European times, followed by further ecosystem degradation with arrival of Europeans including loss of vegetation from grazing livestock and feral goats and loss of native fauna by feral cats. Today after ~60 years of restoration the island has flourishing populations of sea (grey faced, Pycroft's and diving petrels and fluttering shearwaters) and land birds (tīeke, bellbird, kākārīki and kākā), tuatara, geckos (2 species), skinks (4 species) and other invertebrates, and a flora that is well on the way to recovery thanks to a concerted long term effort by the Wildlife Service,



Photo: Rob Chappell

Cuvier Island.



Photo: Rob Chappell

Looking across Blanket Bay toward lighthouse on Cuvier Island.

Department of Conservation and volunteers.

Lighthouse

The lighthouse was built as a kitset in England in 1886 comprising a number of cast iron plates that were brought ashore at Landing Bay then hauled by horses and a pulley system up the gully to the assembly site. Two kauri houses were built as kitsets in Auckland assembled at the top of the paddock behind the current house sites. In 1902 heavy rains washed the two houses off their foundations so they were subsequently relocated to their present position as accommodation for the light house keepers.

In 1941 the NZ Navy built three buildings comprising barracks, ablution block and a generator room, on the summit of what was renamed Radar Point to service a radar aerial, which is now lying rusting on the floor of the barracks. There was also a coast watch tower and a pumphouse, which drew water from the creek below. The entire unit was known as Radar Station No.4 and was built during the development of radar in NZ before it was dismantled and sent to England in 1944.

While the lighthouse was initially powered by kerosene it was converted to electricity in 1941 when a generator was installed. All cooking and heating for the houses until this time was provided by coal. All the glass from the original lighthouse unit is currently stored in DOC Pureora – all 5 tonnes of it.

Restoration

Restoration of Cuvier began in 1957 following transfer of ownership of the island from Gordon Tizard to the Crown for the sum of 500 pounds. At that time there were livestock on the island to provide meat and milk for the keepers of the lighthouse. A team from the Wildlife Service fenced off the eastern two thirds of the island from stock to form a reserve with the western third retained as a farm. Goats were eradicated by 1961 and feral cats by 1966. However, there was an ongoing issue with lighthouse keepers continuing to bring cats onto the island to control the rats despite their contracts requiring that they be “protectors of the tuatara”. This led to tensions between the Wildlife Service and the lighthouse keepers with one keeper setting fire to the island in 1966 and burning 12 Ha of land above Blanket Bay. The same keeper also

destroyed the kiore exclusion enclosure in 1966.



Photo: Paul Huggins

Kākā in Zealadia, Wellington.

After the eradication of feral cats and goats a series of bird re-introductions commenced first with the transfer of 29 North Island saddlebacks/tieke (*Philesturnus rufusater*) from Hen Island to Cuvier Island by Don Merton following the success of a transfer to Red Mercury island in 1964. The birds were released just above North West Bay landing. In 1971 a 10 acre quadrant was set up below the pumphouse in Landing Bay to monitor the bird populations with the wire defining that area still in place; the data from those surveys carried out by Wildlife Service Rangers Dick Veitch and Rob Chappell is currently under analysis by Professor James Russell and students at the University of Auckland. In 1974 30 red crowned parakeets/kākāriki (*Cyanoramphus novaeseelandiae*) bred at the Mt Bruce Wildlife Centre (now Pūkaha National Wildlife Centre) in the Wairarapa were released onto Cuvier. Later it was shown that these birds were hybrids so are considered not suitable for further translocations. Attempts

were made to establish stitch birds/hihi (*Notiomystis cincta*) on Cuvier from Hauturu (Te Hauturu-o-Toi) but without success.

Automation of the lighthouse on the island in 1982 removed the need to have a lighthouse keeper and any livestock to support them so the remaining animals were culled. In 1987 management of the island was transferred from the Hauraki Gulf Maritime Park Board (Dept. of Lands and Survey) to the Dept. of Conservation who established a base in Coromandel town under the leadership of Rob Chappell. More active management of the island followed this transfer of responsibility. A survey for tuatara in 1991 located just 7 survivors, which were transferred to the Auckland Zoo for captive breeding and protection from kiore still on the island at that time. In 1992 a team of students from Whitianga Polytechnic working under the supervision of Rob Chappell demolished the Principal Keeper's house due to its deteriorating condition and planted 1000 pōhutukawa on the hillside behind using seedlings grown by the Tiritiri Matangi reforestation team. In 1999 the at-risk *Calistegia marginata* (small-flowered white bindweed) was reintroduced to the island using 210 plants grown by the Auckland Botanical Society from seed collected from the island many years before. Plant pest control was also initiated and is still ongoing in an effort to eradicate the highly invasive moth plant (*Araujia sericifera*). Restoration of the buildings on the island was also initiated. Archaeologist Neville Richie organised twice yearly working bees of 6 volunteers who stayed for periods of 12 days carrying out building restoration work, track cutting, weed removal, bird surveys and planting.

It was not until 1993 that Cuvier became completely predator free following a brodifacoum helicopter drop by Helitrans. This was the first use of GPS tracking for an aerial toxin drop in New Zealand. Since then the science and technology has advanced significantly with a common protocol being

toxin free pre-feeding drops followed by the toxin drop, at levels significantly less than previously used. Complete removal of kiore from the island was the real beginning of the restoration of Cuvier. A number of species of bird re-established themselves on the island including fluttering shearwaters (*Puffinus gavia*) and diving petrels (*Pelecanoides urinatrix*). Species such as the grey faced petrel (*Pterodroma macroptera*) increased in numbers as did the tīeke, with current populations around 1000 and 2000, respectively. Further introductions of threatened or at risk species were made. Pycroft's petrel (*Pterodroma pycrofti*) chicks that had hatched on Red Mercury Island were relocated as hatchlings to artificial burrows on Cuvier Island in an experiment to see if these chicks could be fledged from that island and further, would they return to the site of hatching or the site of fledging i.e. Red Mercury or Cuvier islands. This experiment was trialed to provide guidance for a proposed threatened species at risk transfer, that of moving Chatham petrel chicks (*Pterodroma axillaris*) from Rangatira Island to neighbouring

Pitt island in the Chathams. At present there are around 100 active burrows on Cuvier Island. The Chatham Island petrel transfer was also a success. Tuatara, from the breeding program at Auckland zoo, and tusked wetas from Mercury Island were also reintroduced to Cuvier in releases from 2001 to 2018. Many bird transfers were also carried out from Cuvier Island including tīeke (3) to Kapiti Island, Tiritiri Matangi, Hauturu, Cape Kidnappers and Boundary Stream, kākāriki to Tiritiri Matangi and bellbirds to Waiheke.

A restoration plan

Since 1960 the ecological restoration of Cuvier has comprised three elements: pest control, natural recovery and species introductions but as discussed above, proper restoration was not possible until the island became totally predator free in 1993. This process has been a combination of both passive (natural recovery) and active intervention to re-establish plant and animal species known to have been formerly present using principles and practices laid out in the DOC Cuvier Restoration Plan (2010-2020)¹. The vision laid down by this plan



Photo: Rob Chappell

Rob Chappell with adult Pycrofts Petrel on Cuvier Island.



Tuatara on Takapourewa/Stephens Island.

There has also been a strong recovery of plant species following removal of grazing livestock and predators from the island. There has been

- Increased abundance of species known to be suppressed by kiore including taupata, kohekohe (*Dysoxylum spectabile*), coastal mahoe, karo, nikau (*Rhopalostylis sapida*), tawapou, coastal maire (*Nestegis apetala*), parapara (*Pisonia brunoniana*) and houpara (*Pseudopanax lessoni*).
- Increased abundance of large-fruited trees whose seeds are dispersed by kereru, such as tawa and taraire either *in situ* or from the mainland.
- Transition of former pasture to a *Muehlenbeckia* dominated shrubland of flax, kawakawa, houpara, rangiora, nikau and *Coprosma* species with occasional forest trees.
- Expansion of *Senecio repangae* on disturbed, open or fertile sites around seabird colonies
- Spread of flax and hardy shrubs such as taupata and karo along the coastal areas subjected to wind and salt spray.

Animal species have also made a dramatic recovery. There has been

- Recovery of land-snail (*Rhytida* sp.), the paua slug (*Schizoglossa* sp.), large spiders and large insects such as *Mimopeus* species, various cicada, centipede and weta species, all likely to have been heavily suppressed by kiore.
- Increased abundance of shore skink (*Oligosoma smithi*) and egg-laying skink (*Oligosoma suteri*) in coastal areas, Pacific geckos (*Hoplodactylus pacificus*) common in pōhutukawa forest and coastal flax, moko skink (*Oligosoma moco*) in open inland sites, and common gecko (*Hoplodactylus maculatus*) widespread and abundant throughout.
- Tuatara came close to extinction with just 7 individuals remaining before feral cats and kiore were removed but with the captive breeding and reintroduction program they are re-establishing well, especially around seabird burrows.

was one of maintaining the integrity of ecosystems and preserving the historic heritage of Repanga.

The combined effects of feral cats and kiore resulted in depletion of seabird fauna and lizards to two and six species respectively. Since removal of these predators the resident breeding seabird fauna has increased to eight species, including the re-establishment of colonies of white-fronted terns (*Sterna striata striata*), red-billed gulls (*Larus novaehollandiae*), Northern diving petrels (*Pelecanoides urinatrix urinatrix*), Northern little blue penguins (*Eudyptula minor iredalei*), fluttering shearwaters (*Puffinus gavia*) and Pycroft's petrels (*Pterodroma pycrofti*); the latter as a result of reintroductions (2000-2002). Terrestrial birds were also severely impacted by mammalian predation, with the apparent loss of pied tomtit (*Petroica macrocephala toitoi*), kākāriki/red-crowned parakeet (*Cyanoramphus novaeseelandiae novaeseelandiae*), tīeke, North Island rifleman (*Acanthisitta chloris granti*), North Island robin (*Petroica longipes*), whitehead (*Mohoua albicilla*) and tui (*Prosthemadera novaeseelandiae novarseelandiae*). Of these,

only tui have naturally re-established a permanent population, still in very low numbers, although the North Island rifleman reappeared on the island from 2005 to 2008. Tīeke (1968) and kākāriki/red-crowned parakeet (1974) have been reintroduced, and are now abundant.

One of the challenges with ecological restoration is knowing what was previously present. The very limited fauna and flora records for Cuvier together with the absence of nearby rodent-free islands have made this task even more difficult. Besides readily available records decisions on what to reintroduce have been guided by (i) construction of conceptual models based on knowledge of natural processes operating on neighbouring islands, (ii) analysis of midden sites and (iii) historic data from survey expeditions.

Throughout this long period of ecological restoration and recovery of Cuvier one person's name keeps appearing and that is former Wildlife Service and DOC ranger, Rob Chappell. Over a period of 50 years Rob has made 63 trips to Cuvier Island. He has many stories to tell of the successes and failures of those early days of restoration efforts on the island involving predator control, animal and bird reintroductions, restoration of buildings, and surveys of the flora and fauna on the island, and the challenges of dealing with lighthouse keepers who were not entirely supportive of their efforts. The current healthy state of the ecology on this island is testament to his mahi. DOC in partnership with manawhenua are continuing the conservation work started by Rob and others.



Photo: Berit Hassing

Harakeke flower.

¹Brandon A and Chappell R (2010). Repanga (Cuvier) Island Restoration Plan 2010-2020. Hauraki Area Office, Department of Conservation. Thames.

Australasian Bittern Acoustics Survey

BARRY SCOTT with PATRICK STEWART (Red Admiral Ecology)

In Spring of 2021 Auckland Council contracted Soundcounts to carry out a baseline autonomous acoustic distribution survey of Australasian bittern (*Botaurus poiciloptilus*; *matuku*) at 31 sites across the southern part of the Auckland region as well as on Waiheke and Aotea Great Barrier Islands. The bittern has the highest threat status of 'nationally critical'.

Data from the acoustic recorders showed that

bittern were very sparsely distributed across these sites probably reflecting the very fragmented nature of their remnant wetland habitats. Booming males were detected at just 4 of the 31 sites; two in the Awhitu Ecological District (Big Bay and Rangiriri Creek) and two on Aotea Great Barrier (Kaitoke and Whangapoua). The analysis confirms that at least six males were present and there were no



Photo: Mike Scott

Bittern on edge of Oruawhero (Medlands) wetland.

instances of males competing with each other at any of the sites. An audio monitoring survey carried out in 2012 estimated at least six birds were on the island at that time¹.

Other wetland species detected included spotless crane (*Porzana tabuensis*) and fernbird (*Bowdleria punctata vealeae*). Here we report the results obtained just for Aotea although the

results of the full survey are available from Council².

Although the method employed will not have detected all males present, the low number of booming males detected confirms that this is a species that is just hanging on at Aotea emphasizing the need for wetland restoration and protection to improve safe habitat for this and the other wetland bird species.

Table: Acoustic detection of cryptic wetland avifauna.

Map ID	Site	Bittern detection	Estimated bittern/site	Spotless crane	Fernbird
53	Okupu road		0	0	√
54	Kaitoke Swamp	√	1	0	√
55	Kaitoke Swamp		-	0	√
56	Kaitoke Swamp		-	0	√
57	Kaitoke Swamp	√	-	0	√
58	Kaitoke Swamp		-	0	0
59	Kaitoke Swamp		-	0	√
60	Kaitoke Swamp		-	0	√
61	Kaitoke Swamp		-	0	√
62	Kaitoke Swamp		-	0	√
63	Kaitoke Swamp		-	0	√
64	Kaitoke Swamp		-	0	√
65	Whangapoua	√	2	1	0
66	Whangapoua		-	0	0
67	Whangapoua		-	0	0
68	Whangapoua	√	-	0	0
69	Whangapoua		-	0	0
70	Whangapoua		-	1	0

¹Geary A, Corin S and Ogden J (2012). Australasian Bittern. Great Barrier Island 2012. Department of Conservation monitoring report.

²Stewart P (2021). Autonomous acoustic bittern distribution survey in the Southern Auckland region and on Waiheke and Great Barrier/Aotea Islands 2020. Contract report 2021_1 by Soundcounts for Auckland Council.

The vascular flora of (Arid) Rakitū Island

JACK WARDEN (Okupu, Great Barrier Island)

In 2020 Rakitū Island was declared predator free following two aerial toxin drops by the Department of Conservation-Te Papa Atawhai in 2018. The removal of ship rats and kiore from the island is predicted to have a major impact on restoration of the flora and fauna of the island, but describing and measuring that change means there is the need to survey and record the current ecological status of Rakitū Island. Over the period 2017-2019 Jack Warden and companions surveyed the vascular flora of Rakitū and here shares with us his initial findings.

Introduction

Rakitū Island (Arid Island) located 2.5 km off the east coast of Aotea/Great Barrier Island is the third largest island in the Aotea Group at ~328 hectares in size with two highpoints which fall towards the centre of the island to form a series of streams which eventually discharge in

the cove at the north-western aspect of the island. The name 'Arid Island' was given by Captain James Cook when the Endeavour passed close to the island in November 1769, probably in response to the apparent bare appearance of the island because of its underlying geology as an eroded remnant of a complex rhyolitic volcano¹. It was later noted that 'Arid Island certainly does not deserve the name bestowed on it by Captain Cook'¹. Rakitū is a culturally significant landscape to the Ngāti Rehua Ngātawai ki Aotea, as it was home to one of their founding ancestors, Rehua.

Human disturbance and impact

The island has had a long history of anthropogenic disturbance starting with Māori in the 13th Century followed by European settlement in the late 1800s. Māori used fire to clear the land for occupation and cultivation of



Photo: Jack Warden

The 'Threatened -Nationally Vulnerable', koru (Lobelia physaloides) photographed on Rakitū Island March 2018. Rakitū Island is the species known southern limit in New Zealand. The species is absent from Great Barrier Island and Little Barrier Island. .

crops, and brought with them kiore and kuri. Archaeological surveys have identified sites of pa, terraces and pits; cultivation sites; obsidian and basalt adzes (toki); and burial sites (urupa)². European purchase of the island from Māori in the mid 1880s resulted in further clearance of vegetation and the introduction of grazing livestock. After several changes in ownership the Island was purchased by the Crown in 1993 from the Rope family and is now managed as a Scenic Reserve by the Department of Conservation in partnership with Ngāti Rehua Ngātawai ki Aotea.

Earlier botanical surveys

The first known record of the vegetation on Rakitū Island is a short account by Frederick Hutton and Thomas Kirk³, who visited the island for just a few hours in December 1867. They noted that most of the open land had been burnt just a few days before they landed by a party of Māori muttonbird (tītī) hunters, a practice to more easily access the bird burrows. They recorded 41 native and 2 adventive vascular plants for the island (Table 1). They also noted “sheltered valleys covered with luxuriant ferns and bush”.

Hutton and Kirk concluded their short account with a statement on the need for a more comprehensive survey of the flora on the island.

“The note just read must be considered as merely a contribution to the botany of Arid

Island. We venture to express the hope that some member of the Institute may visit the island under more favorable circumstances, than fell to our lot, and be able, at least, to make a complete catalogue of its phaenogamic plants and ferns: not only on account of the interesting nature of the locality; but because of the positive value possessed by an exact and minute knowledge of the local distribution of plants, as an element in the ultimate circumscription of their specific limits.”

It was a further 115 years before a more comprehensive description of the flora of Rakitū Island was reported by Cameron & Wright in 1982⁴. They recorded 241 native and 80 adventive species on the island (Table 1). The very large number of adventive species presumably reflected the considerable disturbance of the vegetation from farming. A further survey in 2005 by Cameron and Bellingham⁵ recorded 90 adventive species with little change in the number of native species at 242 (Table 1).

Current botanical survey

With the proposed eradication of kiore (*Rattus exulans*) and ship rats (*Rattus rattus*) in 2017 and confirmation that no surveys of the flora of Rakitu were to be undertaken we took the opportunity to survey the vascular flora of the island. The primary focus of the time spent making various trips to the island between 2017-2019 was to record what species could be confirmed to be present to assist future

Table 1: Total of vascular flora species recorded on Rakitū Island over time (1867 – 2019)

	Years between	Native records	Adventive records	Total
Hutton & Kirk, 1867	-	41 (95%)	2 (5%)	43
Cameron & Wright, 1982	115	241 (75%)	80 (25%)	321
Cameron & Bellingham, 2005	23	242 (73%)	90 (27%)	332
Warden et al, 2019	14	289 (73%)	108 (27%)	397

management decisions on the preservation and restoration of the flora of the island.

From the field trips undertaken between 2017-2019, analysing past reports from the previous studies and New Zealand Herbarium Data we have added ~65 additional species to the vascular flora of Rakitū Island of which 47 are native and 18 are adventive⁶. Of the 289 native species records, 24 are listed as 'Nationally Threatened'⁷ which accounts for 8% of the native species recorded on the Island. Exotic species have increased over time and many of these species are a direct result of past agricultural activities and those that have naturalised around the old settlement area within the cove. Of the 108 adventive records at least 15 are desirable to control and manage long-term due to their potential impacts on natural regeneration and displacement of native species.

Of the 289 native species records, 24 are listed as Nationally Threatened⁷ which is 8% of the total native species recorded on the island.

It is anticipated that the full findings of the various field trips will be published in the near future to include field collection data, a full

description of the islands vascular flora making up the various ecosystem types, changes in the island's vegetation overtime, proposed future changes and potential management techniques for threatened plant species⁶.

Conclusion

Rakitū Island for its size harbours a high number of native species, many of which are of regional and/or national importance and are not found on Aotea/Great Barrier Island or nearby Hauturu/Little Barrier Island. Like many offshore islands, Rakitū Island is an example of a 'lifeboat' in relation to the 'sinking ship' that is New Zealand's native vascular flora. Although the declaration of Rakitū Island as 'Mammalian Pest Free' is an outstanding success in adding an island to the list of successful eradication projects, no surety can be provided to the future trajectory of the Islands vascular flora and decisions that need to be made in relation to what species may need immediate and/or future management priority. Some of the future threats include fire,



Photo: Jack Warden

The 'At Risk-Relict', mawhai (*Sicyos mawhai*) photographed on Rakitū Island March 2018.

pathogens and weed invasion.

Although the opportunity has not yet been missed, conservationist and the public alike need to be presented with facts on the successes and failures of such projects to drive future management decisions especially if we are to consider the vision of a Predator Free 2050. Baseline knowledge of the vascular flora of Rakitū Island will be vitally important in determining whether passive or active restoration methods are employed in the future management of the island by the Department of Conservation in partnership with Ngāti Rehua Ngātawai ki Aotearoa. It is also important that this information is shared with the community and that they get the opportunity to visit and see for themselves how the ecology of the island responds in the absence of predators.

Acknowledgements

I would like to thank the people who have joined me in the field or on trips to the island including Jeremy Warden, Cameron Kilgour, Leon Perrie, Lara Shepherd and Jordan Scarlett.

Herbarium staff at Auckland War Memorial Museum, Museum of New Zealand Te Papa Tongarewa and Allan Herbarium for sharing collection information, data and allowing me to view specimens.

Ewen Cameron for reviewing draft species lists, helping with collections, old specimens and identifications.

The support from Auckland Council and Department of Conservation on the trip in June 2019 is acknowledged.



Photo: Stuff Limited

Rakitū Island in the Hauraki Gulf Marine Park is now pest-free.

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Beyond Barrier

ENVIRONMENTAL NEWS FROM NEW ZEALAND & AROUND THE WORLD

Mōhua thriving in the Landsborough Valley

Mōhua were once widespread in the beech forests of the South Island but the impact of predators has reduced their numbers so severely that they are now listed as endangered on the International Red List of Threatened Species. However, intense predator control in the Landsborough Valley in Westland, has seen numbers bounce back with a population estimated to be at around 485 in the most recent survey by DOC, slightly up from the last count in 2018. Bird counts in this valley have been running for 15 years, which is now DOC's longest-running study.



Photo: Stuff Limited

Mohua.

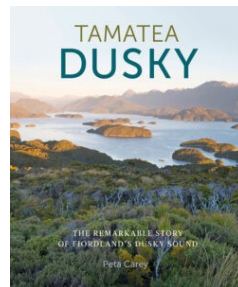
Predator free islands have richer sea life

While it is well known that seabird occupation of islands enriches the soil with nitrogen-rich guano little is known about the impact on the nearshore environment. A recent study by two American biologists has now shown that run off of this guano into the sea enriches nearshore sea life¹. In a study of four islands in the Mercury archipelago off the Coromandel, representing three eradication histories: never invaded,

eradicated 30 years ago, and eradicated 2 years ago, they found macroalgal diversity was highest at never-invaded islands, followed by islands in order of eradication.

Conservation partnerships in Tamatea/Dusky Sound

Predator control at landscape levels requires lots of partners. One of the best examples of this collaborative approach is predator control in Tamatea/Dusky Sound where Real Journeys, Fiordland Conservation Trust, Peregrine Wines, Pure Salt charters and Fiordland Lobster Company are all working with DOC and manawhenua to remove predators from several of the islands in Tamatea. Fiordland Lobster Company partnered with DOC to eradicate stoats from Pigeon Island (73 Ha) and have since funded the reintroduction of mohua, kakarui and tīeke to the island. Pure Salt has established a major trapping network on 1900 Ha Long Island and Real Journeys has done the same on adjacent 1779 Ha Cooper Island. These efforts are enabling tawaki, kea and kākā to flourish. The success of this interconnected island network of predator control provides confidence for even bigger projects like Predator Free Rakiura (1.75 m Ha). For more insight into the remarkable story of conservation and history in Tamatea read Petra Carey's book *Tamatea/Dusky Sound*, which was awarded the 2021 Mountain Book of the Year.



¹Rankin LL & Jones HP (2021). *Marine Ecology Progress Series* 661: 83-96.

Removing Scarface Claw doesn't make rats galore

ANDREW VEALE, Manaaki Whenua/Landcare Research, Auckland

With the proposed removal of feral cats in the northern block of Aotea, it is a good time to discuss both the effects of cats on island ecosystems, and some of the myths around what will happen if they are controlled or eradicated. The scientific literature is very clear that cats have significant effects on island ecosystems, and reviews of the effects of cat eradication have shown a multitude of benefits across taxa of these eradications^{1,2} Few people debate that cats have a severe negative effect on some bird, bat and lizard species on Aotea, but one aspect of cat eradication that has received quite a lot of attention is the possibility of mesopredator release – whereby removing cats could cause undesired consequences, by releasing invasive prey species (in this case rats) which may have worse effects on native prey species.



Photo: Stephen Bradley

Cat killing an albatross on Auckland Island.

One example of invasive species release that has often been cited is on Macquarie Island, where cats were removed before the rats and rabbits, and the rabbit population appeared to increase after cat removal. While some researchers considered the removal of cats on Macquarie Island to be the primary factor in an increasing rabbit population³, this ignored the rabbit population cycles that had occurred since early studies in the 1950s, and also discounted the fact that rabbit numbers were considered to be higher in the mid 1970s when cat populations were uncontrolled. More re-

cent studies⁴ have argued that actually cat eradication did not greatly affect the rabbit population, and instead researchers believe the natural fluctuations of seed and grass abundance was primarily responsible for any changes of abundance around this time for the rabbits.

What about in a New Zealand setting?

There are three kinds of study relevant to what will happen on Aotea: 1) simulation modelling studies of mesopredator release, 2) studies of the effects of cat eradications, and 3) studies of mesopredator release in NZ. All of these point to the risk of mesopredator release being minimal.

A simulation study of mouse/rat/stoat dynamics in New Zealand found that simulated rat populations did peak higher when stoats were significantly decreased (>90 killed) however these effects were minor compared to the bottom up effects of removing mice and rats causing a crash in stoat abundance⁵. Also, in another simulated study found it was highly unlikely that mesopredator release would occur in most New Zealand systems because they are primarily bottom up regulated⁶, whereby seed and fruit abundance leads to more rodents, leading to more cats, rather than being top down regulated where cats control rats, and rats control the amount of seed and fruit.

The best empirical study to date looking at mesopredator of New Zealand pest mammal populations looked at mice/rat/stoat/possum interactions⁷. This was done with four study locations in the North Island, controlling stoats and possums and looking at their effects on rat and mouse densities. They found that there was no measurable response of two mesopredators (rats and mice) following control of the top predator (stoats), but there was com-

petitive release of rats following removal of a herbivore (possums), and competitive release of mice following removal of rats. In another study, this time in grassland, high mouse abundance occurred only on the predator suppression site with regular production of pasture seed, indicating that this food resource was the main driver of mouse populations⁸.

In another study cat/rat dynamics on islands off the coast of Madagascar⁹, the scientists found that there was primarily a bottom up regulation of the relationship, meaning rats and cats having additive effects, but removing cats did not lead to better survival of seabirds. Part of the reason for this is that for long lived species such as seabirds, population growth is much more sensitive to changes in adult survival than to changes in breeding success^{6,9}. Generally, if cats are eradicated on islands, it is unlikely that any decrease in seabird breeding success caused by rat predation on chicks would exceed the benefits accrued due to a significant increase in adult survival^{10,11,12}.

Altogether these studies indicate it is unlikely that the proposed cat removal could result in

mesopredator release on Great Barrier Island. It is unlikely that rats are primarily regulated by cat densities, and even if there is an effect, it is unlikely that the negative effects of any increase in rat population would have a greater effect than the previous rat and cat predation experienced. One final important note is that on Aotea, while removal of cats is occurring in the northern block, rat control is also commencing, therefore even if there was a small effect of cats on rats, the rat populations are already going to be controlled.

The easiest way to imagine the question “do cats control rat populations” is “can you empty a river with a bucket?”. If you had a huge number of buckets constantly being filled, and the river has a small flow, the level might go down a little, but it would never empty. This is the same, for cats versus rats. There will never be enough cats to kill the rats, because for every rat that is killed, a vacant position becomes available, which is rapidly filled with a new rat, because generally rats breed quicker than the cats can eat them.

¹Medina, FM. et al. (2011). A global review of the impacts of invasive cats on island endangered vertebrates. *Global Change Biol* 17: 3503–3510.

²Nogales M, Martin A, Tershy BR, Donlan CJ, Veitch D, Puerta N, Wood B, Alonso J (2004). A review of feral cat eradication on islands. *Conserv.Biol.*18: 310–319.

³Bergstrom DM, Lucieer A, Kieffer K, Wasley J, Belbin L, Pederson TK, Chown SL (2009). Indirect effects of invasive species removal devastate world heritage island. *J Appl Ecol* 46: 73–81.

⁴Springer, K (2016). Methodology and challenges of a complex multi-species eradication in the sub-Antarctic and immediate effects of invasive species removal. *NZ J Ecol* 40: 273–278.

⁵Tompkins DM and Veltman CJ (2006). Unexpected consequences of a vertebrate pest control: predictions from a four species community model. *Ecol Appl* 16: 1050–1061.

⁶Russell JC, Lecomte V, Dumont Y, Le Corre M (2009). Intraguild predation and mesopredator release effect on long-lived prey. *Ecol Model* 220: 1098–1104.

⁷Ruscoe W. et al. (2011). Unexpected consequences of control: competitive vs. predator release in a four-species assemblage of invasive mammals. *Ecol Lett* 14: 1035–1042.

⁸Norbury G, Byrom A, Pech R, Smith J, Clarke D, Anderson D, Forrester G. (2013). Invasive mammals and habitat modification interact to generate unforeseen outcomes for indigenous fauna. *Ecology Appl* 23: 1707–1721.

⁹Ringer D, Russell JC, Le Corre M (2016). Trophic roles of black rats and seabird impacts on tropical islands: Mesopredator release or hyperpredation? *Biolog Cons* 185: 75–84.

¹⁰Dumont Y, Russell JC, Le comte V, Le Corre M (2010). Conservation of endangered endemic seabirds within a multi predator context: the Barau’s petrel in Réunion Island. *Nat Resour Model* 23: 381–436.

¹¹Bonnaud E, Zarzoso-Lacoste D, Bourgeois K, Ruffino L, Legrand J, Vidal E (2010). Top-predator control on islands boosts endemic prey but not mesopredator. *Anim Conser* 13: 556–567.

¹²Hughes BJ, Martin GR, Reynolds SJ (2008). Cats and seabirds: effects of feral domestic cat *Felis silvestris catus* eradication on the population of sooty terns *Onychoprion fuscatus* on Ascension Island, South Atlantic. *Ibis* 150: 122–131.

Tū Mai Taonga – a vision for the future and jobs for now

KATE WATERHOUSE

You might have seen the good news for Aotea in April, with Tū Mai Taonga successful in securing Jobs for Nature - Mahi mō te Taiao funding from Predator Free 2050 Limited.

This support - \$3m over four years - was announced along with details of the government company's backing for five other projects nationwide. Auckland Council is committed to co-funding over the same period. And DOC has given in-principle support to create additional jobs over two years through its regional Jobs for Nature funding allocation. The announcement of Jobs for Nature funding is (we think) some overdue recognition of the value of Aotea's taonga. It is an amazing opportunity to grow long term employment and skills at the same time as protecting native species and restoring the health of our ecosystems.

Tū Mai Taonga was initiated in March 2020 by ACPAC (Aotea Conservation Park Advisory Committee) - comprised of five mana whenua representatives from Ngāti Rehua Ngatiwai ki Ao-

tea and five community members. The project was then developed with DOC and Auckland Council, with the support of the island's sanctuaries, community projects and the Aotea Great Barrier Local Board, with the objective "to protect and restore native species and ecosystems in the Aotea Conservation Park and Northern Aotea."

Tū Mai Taonga (meaning to stand up for our treasures) builds on decades of work and represents the aspirations of groups and individuals across the island.

Currently the Aotea Great Barrier Environmental Trust is acting as the administering party for Tū Mai Taonga on behalf of the collective that enabled it. Guidance and advice is currently being provided by an Interim Steering Group of myself (representing GBIET), Rodney Ngawaka (Kawa marae), Darren Cleave (Motairehe marae), Jo O'Reilly (Okivi community), Jonathan Miles (Auckland Council) and Kirsty Prior (DOC Aotea).

We plan to migrate administration of the project to a new entity in line with the expectations of the funders. This is likely to involve a range of activities including:

- Establishing a TMT charitable trust
- Creating a governance framework with mana whenua and other partners
- Developing a partnership agreement
- Using robust and transparent financial systems
- Finding other funding sources (for example PF2050 Ltd requires a minimum of one for one matched funding)
- Sharing information with the community to enable their support and involvement
- Generating jobs and training opportunities
- Implementing an operational plan to remove feral cats and intensify rat management in the project area.

Programme Lead Jo Ritchie has been working for the project since January 2021 through Auckland Council funding. Jo is working on a feasibility study to scope and size the project and provide management options for consideration.

Operations and finance advisor Dave Braddock and communications advisors Makere Jenner and Tim Higham and were appointed in June and July 2021 to assist Tū Mai Taonga in its initial phases.

Further appointments are expected once an operational plan is approved by the new administering entity and discussed with funders, mana whenua, collective partners and the community.

For updates keep an eye on Tū Mai Taonga's website - www.tumaitaonga.nz - or contact info@tumaitaonga.nz

Background

Aotea is New Zealand's largest possum and stoat free forest and island. However, high densities of rats and feral cats impact the island's native flora and fauna, which include many rare and endangered species. It is likely that some species still present on Aotea will become extinct in our lifetimes if nothing is done to reduce the negative effects of these predators on birds and lizards, and the forests and other ecosystems they depend on.

Vulnerable species include pāteke; tāiko, the black petrel, also known to Ngāti Rehua as takoketai; miromiro, the tomtit; kererū; kākārīki; matuku hūrepo, the Australasian bittern; kākā; and some of the 13 species of skinks and lizards found here.



Photo: Kate Waterhouse

Isolated Rangiwihakaea bay in Te Paparahi was occupied by early Aotea people.

We know community backing for the Tū Mai Taonga project is strong – people want to save what we have left. Community research conducted in 2020-21 amongst land owners and residents in the north of the island showed 96% support amongst those surveyed for reducing feral cats to zero and 100% support for reducing rats to low densities.



Photo: Kate Waterhouse

Mohunga peninsula, Aotea Great Barrier, showing bush remnants that will benefit from the Tū Mai Taonga project.

Obituary: Emma Waterhouse

(25 December 1968 – 7 March 2021)

In March of this year we lost one of our strongest advocates for conservation on Aotea, Emma Waterhouse. What an extraordinary woman. Here, we share some of Emma's achievements and the responses of her friends to her loss.

Emma graduated with a Masters in Environmental Management at Canterbury in 1991 then became the first Environmental Manager of Antarctica New Zealand, aged just 25. She delivered the first State of the Environment Report for the Ross Sea and had a summer stint as base manager at Scott Base, as well as partic-

ipating as a NZ delegate at the Antarctic Treaty Consultative Meetings. She then went on to work at the Ministry of Fisheries as a senior policy advisor, leading NZ's Pacific Tuna delegations. But she was confronted with the full extent of regulatory capture of fisheries management in NZ so left for UK via China, Central Asia and Turkey. Based in Cambridge and London she worked as an environmental advisor for several huge infrastructure projects. In 2010 she moved to Sydney to join Coffey (now Tetratech). The five years there saw her survive the first brush with cancer, and cement her credibility as an environmental advisor globally.



Photo: Kate Waterhouse

Emma Waterhouse at start of Withey's Track, Aotea.

She advised governments and projects in the Asia Pacific region on climate, social, and environmental impacts, and related policy, planning and mitigations. She made several trips to Iraq to advise on large oil projects, including visits to sheiks where body armour was required. There wasn't much she would not do for te taiao. But she was always drawn back to Aotea Great Barrier, where she had spent many a long summer with her family, in the footsteps of her grandmother who came to the island in the 1920s and her parents, Mike and Glen, who met at Glenfern.

Emma was passionate about protecting the birds of the sea and the land.

As a child she grew up following her Dad Mike around Te Paparahi, hearing kokako, kākā, and petrels at night, exploring the creeks and forest, walking the beach and fishing from the rocks. This shaped her world and she always felt connected to the island wherever she was – on tramping and climbing trips in the South Island, on travels to India, Central Asia, and Europe, and also Antarctica, the UK, the Pacific and Australia, where she lived and worked for many years. In 2001, with her sister Kate, she bought land at Okiwi where she spent a lot of time with family restoring the part of the Okiwi stream that flowed across their land between the reserve and the Aotea Conservation Park behind Okiwi.

As Kate said:

"She loved nothing better than to spend a day next to the Okiwi stream, planting, weeding, clearing rat traps and listening to the birdlife that has returned to the river in the 20 years since we started this work. She was looking forward to being a part of Tū Mai Taonga and making a predator free Aotea possible."

Emma was passionate about protecting the birds of the sea and the land. She presented the trust's submission against the CRL marine dumping consent and was looking forward to progressing marine restoration around Aotea. Given Okiwi has the sole breeding population of kākārīki on Aotea, Emma was determined to do all she could to protect them. With help

from Serena Simmonds she initiated two surveys of nest sites in the Okiwi Valley, which lead to an intensification of trapping to protect nest trees. She was passionate about the birds of the Hauraki Gulf and greater East Coast of the North Island. Her commitment to advocating for those birds and their habitat is highlighted in the Autumn 2017 issue of Environmental News, which focused on the importance of the chain of islands down the east coast of the NI that form the "Seabird Super Highway".

To quote Joanne O'Reilly:

"Emma cared deeply about the natural environment and was prepared to put herself out there to support it, especially on Aotea where she and her family had had a close association for many years and across several generations. She (and her family) purchased land here and have spent many hours planting trees along its waterways and undertaking pest control to provide habitat for and protect native species. In addition she gave her time, passion and energy to support many other environmental initiatives and groups on Aotea, including Glenfern Sanctuary, GBI Environmental Trust, island wide bird counts, and the Okiwi Community Ecology Project."

And from Emma Cronin, Chair of the Glenfern Sanctuary trust:

"Emma's many connections and efforts have significantly contributed in leveraging the financial support we now see evident on the island towards progressing pest management for this truly 'great' place. Emma was taken from us too soon to experience the benefits of her and many other peoples' work in making this happen. Her absence will be felt deeply by her family, friends and colleagues and is a huge loss to conservation for Aotea and indeed Aotearoa/New Zealand. We will continue her conservation work with her forever in our hearts and minds and remember her always in the birdsong that will flourish in a future Aotea."

Emma was editor of Environmental News from

2016 to the end of 2020. She set a very high standard for this publication, with well researched articles presented at a high standard and illustrated with high quality images. She was a trustee of Great Barrier Island Environmental Trust from 2016 to 2021. She was instrumental in initiating the Aotea Bird Count, and at the time of her death was Leading the State of Environment Report for Aotea Update on the State of Our Birds, working with multiple stakeholders and data owners to bring together a cohesive picture of Aotea's birdlife to 2020. She was also a Trustee of the Glenfern Sanctuary and Kotuku Peninsula Charitable Trust from 2016-2020. Current chair of the Glenfern Trust, Rupert Wilson, shared this impression of her:

"Emma was an inspiration to the Glenfern Trust - clear and focussed in her contributions around the Trust table; a leader on all conservation and environmental topics and a wonderfully warm and generous personality on all fronts. We all paused and took special note whenever Emma spoke or wrote to us, such was the value and wisdom of her ideas and the stature which Emma had within the Trust."

And from John Ogden:

"Emma's role in the Environmental Trust was generally to defuse contentious issues at Trust meetings, seek the common ground and move us on to the next matter on the agenda. She was very skilled at this. The social and community aspects of the conservation agenda were much clearer to her than to me. I tended to concentrate on the ecological data, which always seemed pivotal to me; the over-layer of community concern was much less clear, but ultimately decisive when it came to action. Progress in the bigger aspects of environmental improvement, biodiversity conservation and human aspirations requires a team of people with mutual respect and the ability to see the long-term goal. Emma had this, she was the perfect team player everybody trusted."

To finish with a quote from Izzy Fordham:

"A lady so dedicated to being a voice for our flora and fauna which captured her love of Aotea and her strong belief in its conservation. I will always remember her gentle way, her pragmatic approach and a smile that lit up the room. Arohanui dear Emma".



Photo: Barry Scott

Metrosideros fulgens.

Emma's presence and impact on Aotea will be sorely missed. On behalf of the Trustees of GBIET we extend our sincere condolences to Emma's family, her Mum and Dad, Mike and Glen, sister Kate and partner Rohan, nieces Grace, Evie and Hazel, and brothers Hamish and Angus and partners Maria and Steph.

Emma died of an aggressive secondary breast cancer, but before she passed away she was able to set up a scholarship for women studying natural sciences at the University of Auckland. She hoped this award would support more women to pursue careers as she had in the protection and restoration of our natural world.

To donate please go to the University of Auckland's website <https://www.auckland.ac.nz/en/giving/donate/a-z-list-of-funds/emma-waterhouse-scholarship-for-women-in-natural-sciences.html>



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The Aotea Great Barrier Environmental Trust gratefully acknowledge the support of the Aotea Great Barrier Local Board for the printing of Environmental News.

