NZ Bird Conference – Programme and Abstracts

Saturday 3 June

	09:00	**Welcome**	
	Session 1	**Distributions**	
1	09:15-09:45	Dan Burgin	Plenary: New Zealand Bird Atlas: The Final Year
2	09:45-10:00	Cleland Wallace	Daily tui migrations in the Manawatu revealed by Atlas monitoring
3	10:00-10:15	Kamolphat Atsawawaranunt*	Projecting present and future distributions of New Zealand's sturnids: insights from ecological niche models
4	10:15-10:30	Pascale Lubbe*	Bird distributions through the ages: New Zealand birds respond to changing climatic conditions
	10:30-11:00	*MORNING TEA*	
	Session 2	**Wildlife Act and Taranaki**	
5	11:00-11:30	Deidre Koolen-Bourke	Plenary: Wildlife Act reform – where to next?

6	11:30-11:45	Bruce McKinlay	A review of the Wildlife Act 1953: Identifying issues for the Society and developing a suitable response
7	11:45-12:00	Danielle Gibas	Safe havens for seabirds and shorebirds in Taranaki
8	12:00-12:15	Allen Stancliff	Waterfowl population trends in Taranaki
9	12:15-12:30	Graeme Taylor	Seabird distribution, status and threats in the Taranaki region
	12:30-13:30	*LUNCH*	
	Session 3	**Taranaki**	
10	13:30-13:45	Alan Tennyson	Fossils from South Taranaki reveal Aotearoa New Zealand as a long-term 'hot spot' for seabirds
11	13:45-14:00	Elise Smith	Kororā monitoring in Taranaki
12	14:00-14:15	Steve Cosgrove	Tracking Kororā: Effective and Affordable Electronic Data Collection
13	14:15-14:30	James Braund	Back to the Beginning: A Fresh Look at J. R. Forster's Descriptions of New Zealand Birds
		Speed Talks	
14	14:30-14:35	Josie Galbraith	Invasion risks of exotic parrots via the pet trade
15	14:35-14:40	Taneal Gulliver	Roosting behaviour and breeding of Dabchicks on urban ponds in Auckland, and

			implications for stormwater wetlands as habitat
16	14:40-14:45	Lindsey Gray	Opportunity Nest Egg: introductory insights from kiwi O.N.E. data on chick nutritional responses and some aspects of life history
17	14:45-14:50	Katie Vanderstok*	Antipredator cautiousness and the evolution of colour in the Eurasian blackbird and song thrush
18	14:50-14:55	Tas Vámos*	Integrating food-storing, spatial memory, and reproductive success in the North Island robin
19	14:55-15:00	Manaia Pearmain-Fenton*	Dispersal patterns and breeding success of two South Island robin/kakaruai populations: from Silver Stream to Orokonui Ecosanctuary
20	15:00-15:05	Miranda Wells	Automated acoustic monitoring and classification system for remote birdlife monitoring
	15:05-15:15	Edin Whitehead	Tara photo competition – Awards
	15:15-15:45	*AFTERNOON TEA, POSTERS*	
	Session 4	**Miscellaneous**	
21	15:45-16:00	Ana Menzies*	Uncovering song dialects in miromiro | ngirungiru | tomtit: How does song differ between and within populations?
22	16:00-16:15	Hui Zhen Tan*	Sex differences in the recombination landscape of the hihi

23	16:15-16:30	Daria Erastova	Another example that urban habitat restoration matters for native birds
	16:30-19:00	*WORKSHOPS, POSTERS, DRINKS*	
	19:00	*INFORMAL DINNER*	

Sunday 4 June

	Session 5	**Seabird Conservation**	
24	09:00-09:15	Colin Miskelly	Morning Report and the storm petrel: how the morning bird call helped reveal where storm petrels probably breed in Fiordland
25	09:15-09:30	Ariel-Micaiah Heswall*	Seabird sensory ecology: Exploring if the colours of plastic resemble the colours of seabird prey items
26	09:30-09:45	Kamya Patel*	Life in plastic, it's not fantastic: A sensory ecology approach to plastic ingestion
27	09:45-10:00	Michael Fox*	How low is low enough? Restoring seabird populations in the face of multi-species predation on mainland Aotearoa
28	10:00-10:15	Edin Whitehead*	Marine heatwave impacts on pakahā fluttering shearwaters
29	10:15-10:30	Inka Pleiss*	Heavy metal pollutants in the northern muttonbird, Ōi/Grey faced petrel
	10:30-11:00	*MORNING TEA*	

	Session 6	**Seabird Conservation**	
30	11:00-11:15	Imogen Foote*	A whole-genome approach to resolve the genetic structure of Antipodean and Gibson's albatross populations
31	11:15-11:30	Natalie Forsdick	Conservation genomics of Kuaka Whenua Hou/Codfish Island Diving Petrels
32	11:30-11:45	Matt Rayner	New Zealand storm petrel: new data on population status and genetic structure
33	11:45-12:00	Johannes Fischer	Assessing offshore threats and management tools for Kuaka (Whenua Hou Diving Petrels) in the face of future change
34	12:00-12:15	Peter Frost	Piecing together a jigsaw – assessing the present state of the Northern Royal Albatross|Toroa global breeding population
35	12:15-12:30	Gaia Dell'Ariccia	A long-term regional programme to restore seabirds in Auckland: challenges, findings and perspectives
	12:30-13:30	*LUNCH*	
	Session 7	**Mostly freshwater and coastal birds**	
36	13:30-13:45	Brendon Dunphy	Seabirds as ocean indicators: migratory connectivity and stress physiology of northern common diving petrels
37	13:45-14:00	Ilse Corkery	The development of a captive rearing program for tara iti

38	14:00-14:15	Keegan Miskimmin	The importance of predator control and island enhancement for tarapirohe/black-fronted tern conservation management at a historic colony on the Waiau-Uwha River
39	14:15-14:30	Matthew McDougall	Monitoring a cultural harvest: trends in Kuruwhengi/Australasian Shoveler population, 2000–2022
40	14:30-14:45	Christopher Bycroft	Water bird surveys in the upper Waikato River and Lake Ōhākurī and Lake Arapuni: 2012-2019
41	14:45-15:00	Phil Battley	Sex differences and effects of migration on intake rates of Bar-tailed Godwits
	15:00-15:30	*AFTERNOON TEA*	
	15:30-17:00	**AGM and Awards**	

** Students*

Posters

1	Glenn Aguilar	Using of geostatistical tools for characterising the spatial and temporal distribution of the iconic New Zealand fantail in Tiritiri Matangi Island
2	Vanessa Barry	Understanding the evolutionary origin of the Manawatāwhi Three Kings Islands toroa Buller's albatross
3	Johannes Chambon	Migratory movements, distribution, habitat preference, and activity patterns of the Critically Endangered Abbott's booby
4	Peter Frost	Surveying albatrosses on remote islands –

		examples of northern royal albatross and northern Buller's mollymawk on the Chatham Islands
5	Chris Gaskin	Catching birds at sea – a tool for conservation
6	Chris Muller	Reinventing wildlife tracking for the 21st Century – Improving the efficiency of radio telemetry
7	Shannon Ritter	The impact of eradication aimed predator control on urban native birds
8	Lindsey Grey	Opportunity Nest Egg: introductory insights from kiwi O.N.E. data on chick nutritional responses and some aspects of life history
9	Katie Vanderstok	Antipredator cautiousness and the evolution of colour in the Eurasian blackbird and song thrush
10	Manaia Pearmain-Fenton	Dispersal patterns and breeding success of two South Island robin/kakaruai populations: from Silver Stream to Orokonui Ecosanctuary
11	Taneal Gulliver	Roosting behaviour and breeding of Dabchicks on urban ponds in Auckland, and implications for stormwater wetlands as habitat

PLENARY ADDRESS

New Zealand Bird Atlas: the final year

Dan Burgin[1], Samantha Ray[1] and Keegan Miskimmin[1]

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The New Zealand Bird Atlas is entering the final year of the five-year data collection period. An estimated $2.4 million worth of volunteer effort has gone into the project so far, from the over 1350 Atlasers who have contributed over 320,000 checklists to the Atlas eBird portal documenting 294 species. To date just 154 of the 3232 Atlas grid squares are still without data, and there is plenty of birding to be done in under-surveyed areas across the country. An update will be provided on how this nationally significant project is progressing, with key updates for the membership and Atlas community provided amongst some initial findings, and more. All of this is to hopefully inspire the Birds New Zealand membership and Atlas community to continue to work together to meet the Atlas project's objectives across the country over the final 12 months. Importantly, we wish to ensure participants observations, and therefore the dataset, are as scientifically valuable as possible to ensure they have lasting positive impacts on bird conservation and research in Aotearoa New Zealand, at a variety of temporal and spatial scales.

Daily tui migrations in the Manawatū revealed by Atlas monitoring

Cleland D. Wallace[1] and Phil F. Battley[1]

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Tui are known to move around for food sources throughout the year. During standardised pre-dusk monitoring in the Manawatū through the winter, a substantial daily exodus of tui out of Palmerston North towards the foothills of the Tararua Range was documented. This has been monitored for 3 years, and results show that the size of this movement is weather-dependent. The movements occurred primarily in the 2 hours before sunset and a little after, with peak numbers about 30 minutes before sunset. Flight paths and heights differed depending on the wind direction and speed, with birds flying lower in headwinds and higher in tailwinds. Numbers were higher on colder days, which were often associated with easterly or southerly winds. Flight paths of flocks (visually assessed) indicate that green corridors, terrain and farm plantings between roost location and feeding areas are important, with larger trees used as rest stops and terrain as shelter from head winds. The relationship between movement and temperature implies that there may be thermal benefits to roosting in the enclosed forests in nearby hills rather than in the urban habitats of Palmerston North city. The magnitude of the movements (peak counts of over 600 tui passing the single monitoring point) highlights the importance of urban vegetation in Palmerston North for this species.

Projecting present and future distributions of New Zealand's sturnids: insights from ecological niche models.

Kamolphat Atsawawaranunt[1*], Annabel Whibley[1] and Anna W. Santure[1]

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The common myna (*Acridotheres tristis*) and common starling (*Sturnus vulgaris*) are two of only three birds on the IUCN 100 Worst Invasive Alien Species list and both species are invasive in New Zealand. Understanding their current niches and any niche changes compared to their native range are key to predicting their future distributions, including areas for potential invasion. We used occurrence records from New Zealand and the native range and biologically justified environmental variables to build ecological niche models of the two sturnid species. We identified important environmental predictor variables for the species distribution and used these to project their present and future habitat suitability in New Zealand. The niches of the species in the native range and New Zealand were also compared to assess whether the species niche had changed. Growing degree days above 5°C was identified as the most important predictor for the myna distribution, with growing season length for the starling. Our future habitat suitability projections for mynas in New Zealand suggest increased suitable habitat areas towards the south, and into the North Island's volcanic plateau. For starlings, future projections suggest increased suitable habitat at higher elevation in the Southern Alps. Our niche comparison analyses found no evidence of niche evolution between New Zealand and the native range, supporting a "home away from home" basis to their success in New Zealand. The habitat suitability projections can be used to help inform management practices, and the niche models can help inform future studies on the global species niche.

*PhD student

Bird distributions through the ages: New Zealand birds respond to changing climatic conditions

Pascale Lubbe[1*], Nic Rawlence[2] and Michael Knapp[1,3]

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[3] Coastal People, Southern Skies Centre of Research Excellence, University of Otago, Dunedin, New Zealand

The impacts of climate on the avifauna of Aotearoa New Zealand should be of great interest to those dedicated to the management and guardianship of birds, especially in light of today's inevitable climate changes. However, these impacts are poorly understood, with most research focusing on the relationship between climate and mammalian predators. While bird distributions today are significantly influenced by predators, modifications to temperature and precipitative regimes affect the availability and type of habitat. To investigate the changing nature of bird distributions in response to climatic conditions, we created species distribution models (SDMs) for seventeen endemic New Zealand birds using presence data from the previous iteration of the Birds NZ Atlas (1999–2004). The bird species modelled in this work represent a wide variety of habitat specialists: forest, open grassland/scrub, wetlands, coastal, and generalist species. Combining these data with palaeoclimate and future climate projections, we developed SDMs for each species spanning three periods: the last glacial maximum c. 21 kya, the present day, and 2061–2080. We then compared model projections within and across habitat types to search for patterns in response to climate change. We predict universal loss in suitable habitat for forest birds during the last glacial maximum and in the future. In other habitats, changes in distributions were more variable, indicating species-specific responses to climate impacts both past and present. In the future, most birds will experience declines in total suitable area; North Island populations are at increased risk of losing suitable habitat.

*PhD student

PLENARY ADDRESS

Wildlife Act reform – where to next?

Deidre Koolen-Bourke[1]

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The Wildlife Act 1953 is one of Aotearoa New Zealand's most dated pieces of conservation legislation. It constitutes our core species protection statute and yet it is a relic of another era: focused as much on 'game management' as species protection. The Act does not distinguish between indigenous and introduced species, nor between the common and the critically endangered. It is not linked to species status assessments and is narrow in scope, excluding all plants, freshwater fish and most invertebrate and marine species. It predates both the climate change and biodiversity crises, as well as modern Treaty settlement legislation. In short: the frame, the definitions, the tools and the Act are no longer fit for purpose. The Act is currently up for review and for the sake of our imperilled species, it is important we get this right. The changes made now need to help us traverse the numerous and significant challenges our indigenous biodiversity will face over the next thirty some years.

The Environmental Defence Society (EDS) has been undertaking a raft of work on the Wildlife Act as part of our Conservation Law Reform Project. Our first issues report, *Conserving Nature,* was published in July 2021. That report highlighted critical defects in the current legislative framework and argued that there is a compelling and nationally significant need to rethink how we manage the conservation estate, threatened species and biodiversity. Accordingly, phase two of the project—*Restoring Nature*—shifted to focus on solutions and options for reform. The findings of our work at phase two, which includes a more detailed report on the Wildlife Act, is due to be released shortly. This presentation discusses those findings and highlights some of the hard conversations the Wildlife Act review will need to traverse.

A review of the Wildlife Act 1953: Identifying issues for the Society and developing a suitable response

Bruce McKinlay[1] on behalf of the Birds New Zealand Council

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The Department of Conservation has announced a 'first principles' review of the Wildlife Act 1953. The Act is the legislation that protects wildlife and manages game bird hunting in Aotearoa. It determines which species are classed as wildlife and regulates many human interactions with these species. The Department has identified that the current Act is not fit for modern conservation management as, among other matters, it lacks the tools to protect threatened species, and prevents fulfilment of obligations under the Treaty of Waitangi.

Wildlife, as defined in the Act, includes both native and introduced species of mammals, birds, reptiles, and amphibians. The Act provides for game bird hunting (currently of 13 species), which is managed by Fish and Game councils. The Act also provides for the establishment and management of wildlife sanctuaries, wildlife refuges, and wildlife management reserves.

As yet, the review has not engaged with the public or interested partners such as the Society. The Society's objectives include encouraging and promoting the study of birds and their habitat use, fostering and supporting the wider knowledge and enjoyment of birds, promoting the recording and wide circulation of the results of bird studies and observations, and to assist the conservation and management of birds by providing information, from which sound management decisions can be derived. Council has started to consider how this 'first principles' review will interact with and affect our objects, and consequently our projects and who we are. This presentation is intended to complement the plenary presentation by the Environmental Defence Society, and to inform a debate by members on how we should proceed in any review.

Safe havens for seabirds and shorebirds in Taranaki

Danielle Gibas[1] and **Sara Larcombe**[2]

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An aspirational community-driven, region-wide seabird and shorebird restoration project is in the initial stages in Taranaki. The Taranaki regional biodiversity trust 'Wild for Taranaki' determined in 2020 through a community marine forum that there was a lot of interest in protecting sites for seabirds and shorebirds in the region, and support was needed to further build on existing activity in the region. Wild for Taranaki contracted Wildlife Management International Limited (WMIL) to scope out the way forward. This community-driven approach to creating a network of restoration sites and bird-minded people is enabling the project to be responsive to the needs of the groups involved. Some of the key areas of focus that have been identified by initial discussions include the need for education in bird identification and data recording, exploration of the historical and current distributions of seabird and shorebird species, and advocacy programmes to share the importance of these species, as well as hands-on actions such as predator trapping and replanting natives to protect sites of interest. Outcomes of this project will be measured in traditional bird terms, such as nest counts, fledging success, and increased sightings; but also in social terms, measuring the project's ability to provide effective support to voluntary and professional groups alike. Using community aspirations as its driver, this highly collaborative project aims to guide and support the establishment of safe havens for seabirds and shorebirds initially over a ten-year period.

Waterfowl population trends in Taranaki

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In conjunction with annual estimates of species harvest using telephone surveys of randomly selected game bird hunting licence holders, Fish & Game Councils monitor the abundance of mallard/grey duck, paradise shelduck, shoveler duck, black swan and pukeko via counts and banding (mallard/grey duck). In the Taranaki Fish & Game Region, paradise shelduck have been counted in the January moult at up to 80 sites throughout the Region since 1993 to provide an index of population trends. Counts have decreased at sites in the Waimarino and Whanganui areas but remain strong at sites in the Taranaki province, particularly at sites on the ringplain surrounding Taranaki Maunga. Since 1991, Taranaki Fish & Game has contributed to January counts of black swan in the central NZ area, which includes the Nelson/Marlborough and Wellington Fish & Game Regions. January counts of black swan in central NZ go back to 1977. While swan counts have remained stable at modest levels in Taranaki, in recent years counts have increased significantly at Farewell Spit, Wairau Lagoons and Lake Wairarapa. Since 2005, trends in pukeko abundance on the Taranaki ringplain have been monitored with drive-by counts along 17 randomly selected road transects in early April. Route regression analysis indicates that the population remains stable. Taranaki has also experimented with April aerial counts of dabbling duck on the Taranaki ringplain and has undertaken banding at sites in the Waimarino (2017–2019) and Whanganui (2020–2023).

Seabird distribution, status and threats in the Taranaki region

Graeme Taylor[1] and Mike Bell[2]

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The lack of larger offshore islands along the west coast of the North Island gives the impression that this region is not important for seabirds. Yet the Tasman Sea, with its underwater ridges, seamounts and extensive shelf areas, creates a rich foraging habitat for seabirds. There is a surprising range of seabird species that attempt to breed on the near shore stacks and islets of Taranaki. Nga Motu (Sugarloaf Islands), off New Plymouth, have the richest diversity of seabirds on this coastline including nationally important colonies of flesh-footed shearwater and diving petrels. The coastal margins in this region also support small and increasing colonies of grey-faced petrels and little penguins. Gulls and terns also breed on islands away from mammalian predators. Population surveys in the late 1980s and 1990s, and again in 2019 provide a 30-year timeline of changes in seabird populations along this coast. Past threats such as offshore oil prospecting and fisheries bycatch are being replaced by new concerns around offshore wind farm development, increasing light pollution from urban expansion and climate change. This short talk will discuss the trends in the seabird populations and the future risks they face.

Fossils from South Taranaki reveal Aotearoa New Zealand as a long-term ‘hot spot’ for seabirds

Alan J. D. Tennyson[1]

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Five globally important seabird species have been described from the 3 million-year-old fossil record of South Taranaki in the last five years. These include a shearwater (*Ardenna davealleni*), an albatross (*Aldiomedes angustirostris*), a crested penguin (*Eudyptes atatu*), a petrel (*Procellaria altirostris*), and a giant petrel (*Macronectes tinae*). The shearwater is as large as the largest living shearwaters but closely related to the more delicate Buller’s shearwater (*Ardenna bulleri*). The crested penguin is considered to be a very early member of the genus, with a thinner beak, indicating a different feeding ecology to living species. The albatross is unlike any living species, being notably smaller with a uniquely narrow beak, indicating a more piscivorous diet. The *Procellaria* is a large species, closely related to the Westland petrel (*P. westlandica*) and white-chinned petrel (*P. aequinoctialis*). The giant petrel is smaller than living species of giant petrels, with features of the humerus providing new evidence for a closer relationship with some of the smaller fulmar species. Together these fossils reveal a rich diversity of seabirds. They provide a glimpse into the marine fauna just prior to the onset of the ice age in the Pliocene. The richness of the fauna and the beautiful state of preservation of many of the fossils from this site make it one of the most important for understanding the evolution of seabirds both locally and globally.

Kororā monitoring in Taranaki

Barbara Hammonds[1] and **Elise Smith**[2]

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Kororā/ little blue penguins used to nest beneath the holiday baches at Oakura beach and the more permanently occupied baches at Ngāmotu Beach. These nesting areas have become increasingly restricted, and the baches at Ngāmotu Beach were removed in 1997. What happened to the birds? In fact, where were kororā living around the Taranaki coast and how were they doing? Answering these questions, along with providing accommodation for kororā, became one of the goals of the Ngā Motu Marine Reserve Society, along with increasing the awareness about kororā for the general public. Since the early 2000s, the Society has worked with local businesses, teachers, technical experts, and the wider public to gain a better understanding of penguin whereabouts and behaviour through various projects, some of which used remote sensing. This monitoring has reached a new level of sophistication, with the help of scientists from the NZ Penguin Initiative and various funders. In partnership with local hapū Ngāti Te Whiti, a group of volunteers regularly monitors penguins that use nest boxes in the Te Kahui colony in the Port Taranaki area and another nesting area in a rock wall close by. A similar project run by Ngā Mutunga in North Taranaki is studying kororā at Wai-iti and Urenui beaches.

Various technologies have been employed in this work. A combination of RFID tags, Axy Trek GPS units, cameras, RFID readers, temperature loggers, a phone app and volunteer time have allowed us to find out where kororā go to feed, their nesting and fledging success, a great deal of kororā behaviour, and the start of being able to assess population size and stability. These electronic monitoring tools provide quantifiable information about nest-box conditions and bird activity, and allow us to minimise disturbance whilst monitoring nests and retrieving GPS trackers. Using security cameras with live-feed and replay, field cameras and Radio-frequency Identification (RFID) readers at artificial nest box entrances we can rapidly respond to tracked birds arriving back at the nest. The use of phone apps to watch the cameras and see the RFID number of a bird arriving or departing allows a team to stay out of the colony and arrive when required to capture a bird. Urban kororā are wary and will not enter the colony when humans are present. Using technology results in less bird stress and greater likelihood of retrieving the GPS device. Considerable innovation and improvisation have been required over the last decade to reach a point where surveillance tools can be deployed as stand-alone units on individual nests, solar powered and transferable. Development of these systems will be covered in another talk.

Tracking kororā: effective and affordable electronic data collection

Steve Cosgrove[1] and Andrew Hornblow[2]

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[2] Educational Consultant – Internet of Things, 80 King Street, Opunake (andrew.hornblow@gmail.com)

Conservation in New Zealand relies on innovative techniques that have been used to assess the state of native species, protect and support remaining populations, and assist with breeding. Generally, equipment used has seen less innovation. There is merit in using monitoring and measuring technology that is proven and reliable, and in general, this strategy has worked at producing valid scientific data. Our project to learn more about kororā, little blue penguins, started with a different kaupapa to many ornithological studies. Rather than a primary focus on a research question, the aims of this project gave equal weight to involving the community in a project that would also introduce information technology elements in an innovative way. This case study outlines the original information and communication technology (ICT) used in the project. The transition is described as each ICT component is migrated to newer technologies that become available to the project team. The current components include low-cost temperature sensors to monitor borrows and RFID readers to identify individual birds. These devices are supported by a management ecosystem using the PicAxe education-focused microprocessor and the Raspberry Pi computer, which was also designed as an educational tool. LoRa radio frequency transmission devices, and the MQTT telemetry data protocol are used to move data on the Internet. The data can then be viewed in real time using a free plan from the Cayenne IoT dashboard. GitHub is used to store data long-term while making it accessible. IBM's Node-Red platform is used to generate reports and display required long-term graphs. For almost a decade now simple tools have enabled remote monitoring at low capital and no on-going costs. Thermometry techniques have been used and proven to be a useful method of continuously remotely monitor nest occupation and kororā activity.

At the end of the day there will be an informal workshop and tech talk from the Taranaki kororā projects team

Researchers like consistency and certainty. Methods used to study birds have been refined over many years and there needs to be a good reason to change. This workshop will showcase some of the technologies used by the Taranaki kororā projects, with demonstrations of the operation of the equipment and examples of outputs that can be obtained. Come along and try pretending to be a kororā. Watch the results in our real-time display and see how that information has been used for this project. The emphasis will be on a researcher heavy, technical-light treatment, but if you want to know more of the technical details, you can find that too.
There are also elements of interest to those looking for a school project. Parts of this workshop and numerous other projects that Andrew has been leading came with a strong educational focus.

Back to the beginning: A fresh look at J. R. Forster's descriptions of New Zealand birds

James Braund[1]

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This year marks the 250th anniversary of the arrival in New Zealand of Johann Reinhold Forster (1729–1798) and his son George (1754–1794), the official naturalists on James Cook's second Pacific voyage. Over the course of three visits between early autumn 1773 and late spring 1774, the elder Forster produced the earliest documented scientific descriptions of some 37 New Zealand bird species, 33 of which were also provided with a matching drawing by his son – an achievement that represents a scientifically important and fundamental contribution to the early ornithology of this country. Forster's descriptions of New Zealand birds can be found in his *Descriptiones Animalium*, a Latin manuscript in which he documented zoological discoveries made as the voyage proceeded, but which did not appear in print until 46 years after his death when it was edited and published by Hinrich Lichtenstein of Berlin in 1844. This posthumous edition of the elder Forster's zoological descriptions is the version on which specialists have relied almost exclusively over the last 180 years, but it is also, as Erwin Stresemann noted in 1951, a clumsily edited text. With this in mind, this presentation takes a fresh look at J. R. Forster's original Latin manuscript. It will briefly (a) introduce and describe the manuscript;(b) outline some of Lichtenstein's more egregious editorial failings; and (c) consider how his poor editing has obscured until now the true extent of Forster's work and thinking on New Zealand avifauna.

Speed talk

Invasion risks of exotic parrots via the pet trade

Margaret Stanley[1], Ellery McNaughton[1], Rachel Fewster[2] and **Josie Galbraith[3]**

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The global trade in companion animals plays a major role in facilitating the spread of invasive species, with this now arguably the most likely pathway for the establishment of exotic birds in Aotearoa New Zealand, either through deliberate release or accidental escape. Although any one incident may only involve a few individuals, the cumulative effect of these escapes over time increases the likelihood of establishment. We analysed online listings of lost birds from two popular websites in New Zealand to evaluate the invasion risk from pet birds. A total of 1205 birds were listed as lost over ~3.5 years, a rate of loss of 331 birds per year. Parrots made up 92% of all lost birds, with human population size and median income influencing rate of loss. While single individuals accounted for 77% (n=931) of lost birds, the remainder were lost as a part of a group (n=96 groups, group size range 2–20). Simulations of propagule pressure show that the proportion of time with at least one male-female pair at large somewhere in Auckland is very high for species such as ring-necked parakeets (*Psittacula krameria*) and Alexandrine parakeets (*Psittacula eupatria*). Many of these species have proved highly invasive in other parts of the world, and their establishment here would have serious consequences for native ecosystems. Given the expense and difficulty of eradicating or managing invasive birds, preventing their establishment is the most effective way of protecting native birds from this type of threat.

Speed talk

Roosting behaviour and breeding of dabchicks on urban ponds in Auckland, and implications for stormwater wetlands as habitat

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The New Zealand dabchick (*Poliocephalus rufopectus*) is a nationally threatened and endemic grebe species whose conservation relies on comprehensive understanding of its life history. However, current literature lacks information regarding dabchick roosting behaviour and locations, particularly where they occur on constructed stormwater wetlands. In this study, we investigated dabchick roosting and breeding success across three stormwater wetlands in Auckland as opportunistic and supplementary to more intensive monitoring of a breeding pair at one pond. We utilized a thermal imaging scope to identify nocturnal roosting sites and documented incidental behavioural observations. This paper presents our findings on dabchick roosting patterns, associated behaviours, and breeding success on Auckland stormwater ponds, contributing valuable insights for species conservation efforts and potentially the application of urban infrastructure to support the recovery of this threatened species.

Speed talk with poster

Opportunity Nest Egg: introductory insights from kiwi O.N.E. data on chick nutritional responses and some aspects of life history

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We present an analysis of data from 306 kiwi chicks that were hand-raised as part of Operation Nest Egg. Chicks were from Coromandel, Eastern and Western taxa brown kiwi raised at the National Kiwi Hatchery, Rotorua, and from rowi and Haast tokoeka at the West Coast Wildlife Centre, Franz Josef. From 2016–2018, a new maintenance diet was introduced at NKH and WCWC. The new diet was formulated to improve health, and replaced an “old” diet. We determined the nutritional composition of each diet and then, taking advantage of the congruence in husbandry methods used at both ONE centres, compared the growth responses of brooder room chicks from each taxon to the diets. We found that the new diet is much closer to the estimated wild adult kiwi diet in macronutrient composition, being high in energy and fat, while most of the energy in the old diet comes from protein. The new diet also provides a better Ca:P ratio, more omega fatty acids, and more carotenoids. While the new diet supports more consistent growth efficiency outcomes across the taxa than the old diet, we found a lot of variation in responses – especially between the Coromandel, rowi and Haast populations. These differences highlight the need to refine the chick captive diet, especially for chicks of differing genetic backgrounds and ages, and we present methods to achieve this. Improving chick diets is important as ONE continues indefinitely, and the life-long and trans-generational impacts of inappropriate developmental nutrition are becoming well known.

Speed talk with poster

Antipredator cautiousness and the evolution of colour in the Eurasian blackbird and song thrush

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More colourful birds are often more cautious than their duller counterparts. Theory suggests this is because they are under higher risk of predation due to being more conspicuous (visible) to predators, and are therefore being more cautious to compensate for this. Studies of sexually dimorphic species usually support this 'compensation hypothesis', finding conspicuous males are more cautious than duller females. However, female birds may also be less cautious than males if their greater energetic investment in reproduction requires them to spend more time foraging, at the expense of caution (the 'caloric requirements hypothesis'). We tested these hypotheses in the Eurasian blackbird (*Turdus merula*) and song thrush (*Turdus philomelos*) by measuring the cautiousness (vigilance and Flight Initiation Distance) of birds which varied in colouration at the species, sex, and individual levels during both the breeding and non-breeding seasons. This involved behavioural observations of foraging birds, alongside colour photography and spectrometry to measure their bill and feather colouration. Song thrushes were more cautious than blackbirds, despite lower conspicuousness, likely due to niche differences. Interestingly, male blackbirds were not more cautious than females, which does not support the compensation hypothesis. However, female blackbirds were less cautious (and foraged more) in the breeding season, and more colourful females (brighter bills and darker feathers) were less cautious, supporting the caloric requirements hypothesis. These findings have important implications for the evolution of colour in birds, particularly why female colouration is often less conspicuous than that of males.

*MSc student

Speed talk

Integrating food-storing, spatial memory, and reproductive success in the North Island robin

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Many species of birds cache food items for later retrieval, a behaviour that requires spatial memory to accomplish. Understanding the relationship between spatial memory, caching behaviour, and fitness is essential for answering the question of how cognition evolves in these birds. In this study, we quantified individual differences in food-storage behaviour, spatial memory ability, and reproductive success in wild North Island robins (*Petroica longipes*). We first measured the spatial-temporal distribution of cache sites that robins made, finding that individual birds fell along an axis between 'clumping' their caches close together, and 'scattering' their caches far apart. We then took advantage of the inquisitive nature of the robins and trained them to interact with experimental apparatuses designed to test their spatial memory abilities. Finally, we conducted a three-way analysis between spatial memory, caching, and reproductive success to determine whether there was evidence of natural selection acting on cognition and/or behaviour in these birds. We found that spatial memory and caching behaviour covaried, with male robins that created many scattered caches having more accurate spatial memory abilities than those that created only several, nearby sites. However, there was no effect of caching or memory on reproductive success, indicating that there is no single 'ideal' cognitive or caching strategy in robins. We discuss these results in the context of the wider field of cognitive ecology, and suggest that environmental factors may soften or strengthen the effect of natural selection on food-storing behaviour and associated cognitive abilities in these birds.

*PhD student

Speed talk with poster

Dispersal patterns and breeding success of two South Island robin/kakaruai populations: from Silver Stream to Orokonui Ecosanctuary

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Dispersal is an essential behaviour that allows individual birds to find new habitats despite the changing environmental conditions of location, season, or year. The most common form of movement is natal dispersal, where young birds move from where they fledged to where they first attempt to breed. However, this movement can only happen when there is an appropriate level of connectivity between suitable areas. For bird populations inside fenced ecosanctuaries or artificial 'island ecosystems', having access to suitable habitats is critical for their reestablishment into non-fenced areas and, ultimately, population survival. We focused on a single South Island robin/kakaruai (*Petroica australis)* population residing within Orokonui Ecosanctuary, first translocated from Silver Peaks and Flagstaff in 2010. In 2022, we replicated surveys encompassing areas of both remnant and revegetated habitats adjacent to the sanctuary boundaries, which were first conducted during the 2018 and 2019 breeding seasons. We then compared the results over spatial and temporal gradients. For a species to successfully 'spill over' out of fenced ecosanctuaries, there must be suitable habitats and means to reach them through connective habitat corridors. However, simply dispersing into new habitats is only helpful if individuals can establish breeding territories and produce offspring. In this study, we aim to investigate if a fenced population can successfully re-establish itself throughout a highly fragmented surrounding landscape. We then argue that maintaining areas of appropriate, accessible habitat in which predators are sufficiently suppressed outside ecosanctuaries is crucial for the persistence of many dispersing bird species.

*MSc student, Ngāti Awa

Speed talk

Automated acoustic monitoring and classification system for remote birdlife monitoring

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Traditional methods for monitoring bird populations are labour-intensive, requiring physical fieldwork and manual data processing. These practices limit the scope and frequency of data collection, thereby constraining our understanding of avian population dynamics. To address these challenges, we are in the process of prototyping an innovative, solar-powered system for continuous, remote monitoring of bird populations. Our proposed device leverages an integrated machine learning (ML) model, informed by recent advancements in bird classification from Google Research, to autonomously identify and record distinct bird calls. This system significantly improves upon traditional manual processes, offering the possibility of continuous, long-term data collection with minimal human intervention.

Designed for remote areas where conventional data links are unavailable, our device integrates Swarm's microsatellite technology for data transmission back to our central server. We aim to establish a network of these solar-powered devices, with one unit transmitting data via satellite and the rest sharing their findings through a low-power, long-range (LoRa) communication protocol. This design negates the need for equipping every unit with a satellite modem and eliminates the requirement for frequent visits to replace batteries, further reducing the environmental impact and human labour required.

In parallel, we are developing an interactive online platform, www.hark.nz. This platform allows users to upload and label their bird recordings, contributing to the enrichment of our ML model's training data and providing a tool for the public to identify bird calls in their audio recordings. Our ongoing project represents a potentially transformative advancement in the field of bird monitoring. We anticipate that our system will significantly reduce manpower requirements, enhance data availability, and provide more comprehensive insights into avian population dynamics over extended periods. This project underscores the potential value of integrating advanced technologies into wildlife conservation efforts, presenting an innovative, sustainable approach to preserving and understanding our natural world.

Uncovering song dialects in miromiro | ngirungiru | tomtit: How does song differ between and within populations?

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Geographic variation in bird song, or 'bird dialects', can help us understand vocalisation function, communication behaviour, and social and environmental pressures acting on populations. Miromiro or ngirungiru (tomtit, *Petroica macrocephala*) are widespread in Aotearoa New Zealand, but are relatively under-studied, with little known about their communication or behaviour. To address the research gap on miromiro | ngirungiru, we investigated song dialects in this species on both macro and micro scales (>100 km to 100 m). We investigated if song dialects exist (1) between North and South Island subspecies (*P. m. toitoi* and *P. m. macrocephala*), (2) between different North Island populations, and (3) within individual North Island populations. We recorded male song from six North Island sites (Bay of Islands, Waitākere Ranges, Coromandel Forest Park, Taranaki National Park, Tararua Ranges, Remutaka Ranges). South Island recordings were obtained from public bird song archives. We tested for differences in song acoustic frequency, duration, composition, and complexity. Our results indicate that song dialects exist between North and South Island subspecies, and both between and within North Island populations. Song characteristics varied substantially even between neighbouring birds, and differences increased with geographical distance. Possible reasons for these dialect differences include limited dispersal, geographic isolation, vocal learning mechanisms, and social selection pressures. These findings are an important first step for future research on miromiro | ngirungiru behavioural ecology and suggest that bioacoustics may be a useful tool in monitoring populations and dispersal.
*Student

Sex differences in the recombination landscape of the hihi

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The hihi, or stitchbird (*Notiomystis cincta*), is a passerine endemic to Aotearoa New Zealand that is the sole living representative of a unique evolutionary lineage. Once widespread across the North Island, the hihi underwent drastic population declines following European settlement and now survives on only a handful of islands as well as in managed sanctuaries. The population history of the hihi makes it a good model organism for studying the genomic impacts of population bottlenecks. Past studies on the hihi have found low genetic diversity, even relative to other threatened birds. Our study aims to dive deeper into genetic diversity in the hihi by characterising recombination. Recombination, or the exchange of genetic material between chromosomes, is one major way that new combinations of genes can arise, providing the building blocks for evolving novel traits. We used Lep-MAP3 software and genome-wide marker information to infer the landscape of recombination within each chromosome and between sexes. We found very low recombination rates in some areas of the genome, which may limit adaptation in response to selection pressures such as climate change. We also found that males have a higher recombination rate, likely due to the strong sexual conflict in the species that leads to very high rates of extra-pair matings. Our findings add to a growing pool of data demonstrating differences in recombination rates between sexes and across the genome. Future work will aim to characterise associations between recombination rates and the adaptive potential of hihi.

*Student

Another example that urban habitat restoration matters for native birds

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Urbanisation often causes habitat fragmentation and loss of biodiversity. It results in limited opportunities for people in cities to connect with wildlife and can lead to increased mental health issues. Volunteer habitat restoration activities can raise public awareness of the challenges faced by native taonga and the overall quality of city life and therefore improve human well-being. We studied how the habitat restoration efforts by the local volunteer community group affected native birds in Mangemangeroa Reserve, one of the high-value urban reserves in Auckland, New Zealand. We compared bird compositions in various restored habitats at different stages of maturity with primary habitats in the area. We found that more mature habitats had similar compositions to primary or self-restored patches with native species domineering over the introduced birds. Conversely, the proportion of taonga birds was comparatively low in newly restored habitats, probably due to the low invertebrate diversity and direct competition for space with the introduced species. We conclude that community habitat restoration plays crucial for vulnerable urban ecosystems and can serve as a conservation tool to support native wildlife. Moreover, engaging volunteers in local groups on planting days and subsequent plant management can increase restoration success and ownership while reducing the project cost.

Morning Report and the storm petrel: how the morning bird call helped reveal where storm petrels probably breed in Fiordland

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Evidence that grey-backed storm petrels (*Garrodia nereis*) breed within Fiordland has continued to accumulate since an initial compilation of sightings was published in *Notornis* in 2017. In addition to numerous sightings of live birds spread over an area of more than 26,000 km^2, and up to 90 km from the coast, adults with bare brood patches have been caught, and several fledglings with down attached have been found. A clue to where the storm petrels might breed within Fiordland was revealed in March 2019, when a passive acoustic recording device used to monitor kiwi call rates at a remote site picked up several mystery bird calls. The sequence of events that led to the identification of the calls is described, including the unexpected role of the Morning Report bird call that is played on Radio New Zealand every business day.

Seabird sensory ecology: Exploring if the colours of plastic resemble the colours of seabird prey items

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Plastic is an environmental issue affecting a diverse array of animal groups including seabirds. Previous studies show that plastic could be acting like a sensory trap where the seabird mistakes the smell of plastic for the smell of prey. Little research uses sensory ecology to understand if the colour of plastic is also acting like a sensory trap, resembling the colour of the seabird's prey. Our aim is to explore if plastic ingestion is selective and if plastic colour resembles the colour of seabird prey items. We used online databases to obtain colours of plastic found along New Zealand (NZ) coastline. We then performed gut dissections of NZ procellariformes to obtain ingested plastic. Using a spectrometer, we measured the spectral reflectance of the ingested plastics and compared it with the spectral reflectance of the seabirds' prey items. There was no correlation between ingested plastic colours and plastic colours found on NZ coastlines. This suggests that NZ seabirds could be selecting certain plastic colours since they are consuming different colours compared to what is available in the environment. Also, when modelled into a seabird's vision, seabirds cannot tell apart most plastic colours from prey items. Therefore, the colour of the plastic could be acting as a sensory trap, resembling the colour of seabird prey. Sensory ecology is a useful tool to analyze plastic ingestion from the seabird's perspective as it displays that NZ seabirds could be selecting certain plastic colour, and also highlights the importance of exploring it on local scales.

*PhD student

Life in plastic, it's not fantastic: A sensory ecology approach to plastic ingestion

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Sensory ecology is the study of an animal's perception of their environment through stimuli processed by their sensory systems. Seabirds possess highly developed sensory organs adapted to their exceptional lifestyle, behaviour, and environment. Highly developed sensory systems may increase seabirds' vulnerability to threats associated with sensory aspects such as plastic ingestion. However, all plastic research relies on human perception of plastics, even though seabird and human senses are drastically different. In this research we investigated plastic ingestion through a seabird's perspective. Although seabird families share many characteristics, individual differences such as feeding behaviour exhibit variation. Albatrosses (family Diomedeidae) feed on the water's surface, gannets (family Sulidae) employ plunge dives, and shags (family Phalacrocoracidae) feed through pursuit beneath the water. We used morphological measurements of skeletal and sensory structures and found visual and olfactory differences between albatross, gannet, and shag species. We also conducted a multispecies survey of seabird carcasses and guano to investigate if the sensory differences of albatrosses, gannets and shags led to differences in plastic ingestion rates in Aotearoa. The survey found very low incidences of macroplastics in albatross, gannet, and shag species, suggesting documentation techniques such as ad hoc observations and low diversity in study species may be skewing our perception of actual plastic ingestion occurrences. Faecal microplastic colour and type varied between species, suggesting differences due to foraging and nesting locations. Importantly, despite being of great interest, seabird plastic ingestion is greatly understudied.

*MSc student

How low is low enough? Restoring seabird populations in the face of multi-species predation on mainland Aotearoa

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Burrowing seabirds are among of the most threatened groups of animals, with introduced species a major cause of their historic and contemporary declines. In Aotearoa/New Zealand introduced species are a major factor limiting seabird breeding to offshore, predator-free islands. The grey-faced petrel/ōi (*Pterodroma gouldi*) is endemic to the upper north of Aotearoa. While not threatened overall, this species is only abundant at a few offshore island sites, and has small declining populations at most other sites, especially upon the mainland. Nonetheless, they are one of the few burrowing seabirds remaining on mainland Aotearoa, and although vulnerable on the mainland from predation, at many sites they are afforded some protection by community predator control. Successful mainland restoration requires knowledge of how low and which species to target to achieve biodiversity outcomes. Here we derive density impact functions (DIF) for rat, stoat, cat, and possum abundance and the breeding success of grey-faced petrel across six coastal sites in the Waitākere Ranges (West Auckland). In 2022 we followed the fate of 160 nests and assessed the relationship of predator abundance on breeding productivity using camera traps, tracking tunnels, and community predator control data. Despite relatively high abundance of rats, breeding success remained high across a range of sites, with nest failure most accurately predicted by increased stoat abundance during the early chick rearing period. Our study represents a novel application of DIFs, insights into the ability of vulnerable seabirds to recover in a predator-managed landscape, and highlights the potential for seabird restoration on mainland Aotearoa.

*PhD student

Marine heatwave impacts on pakahā fluttering shearwaters

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Beginning in December 2021, a marine heatwave event in the wider Tīkapa Moana, Te Moana nui a Toi / Hauraki Gulf region resulted in sea temperatures up to 2.65˚C above the long-term average. Acute events like marine heatwaves can have huge impacts on ecosystems and species, in addition to the persistent trajectory of ocean warming over the past decades. Seabirds are adaptable to fluctuating marine conditions and it can take extreme events to cause mortality and breeding failure. Here we assess sublethal signs of a population under stress, which may be more informative for potential conservation action. By comparing three years of data from 2019–2021 on foraging, physiology, and diet of pakahā fluttering shearwaters (*Puffinus gavia)*, we examined the impacts that this heatwave event had on their ability to breed successfully. We found that during the 2021 marine heatwave, foraging trip duration doubled in parent fluttering shearwaters compared to previous years, while both adult and chick mass decreased, and the trophic signature of adult diet increased. In response to the marine heatwave, adults predominantly changed foraging time budgets, but still suffered some loss in body condition as well as compromising the health of their chicks. Using these data and global literature, we hypothesise the mechanisms underlying this response to elevated sea surface temperatures. A key facet missing is an understanding of the links and energetic transfer between trophic levels. We discuss the need for ecosystem focused research to understand the sensitivity of the ecosystem to the changing climate, particularly as marine heatwaves become frequent and intense in Aotearoa.

*PhD student

Heavy metal pollutants in the northern muttonbird, ōi/grey faced petrel

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Heavy metal pollution in the ocean poses health threats to humans and wildlife alike but is difficult to monitor due to regional variation and accumulation at depth. Seabirds have potential to be used as bioindicators to better understand this growing issue. Grey faced petrel/ōi (*Pterodroma gouldi*) are endemic to New Zealand and represent a traditional food source for northern Māori. However, ōi have the highest mercury (Hg) concentration of any petrel recorded. This study assessed the elevation of heavy metal pollutants in ōi blood and feathers. Blood and feathers were sampled from Ihumoana, Tāwharanui, and Ōtata on the North Island of New Zealand. Total mercury (tHg) concentrations were above suggested toxicity thresholds in both blood and feather samples of adults, and total arsenic (tAs) concentrations in blood samples were also of concern. This study presents the first long-term time series on tHg concentrations in ōi feathers by comparing contemporary and archival samples. An unexpected decreasing trend was observed but may reflect the potential use of Hg in the preservation of Auckland War Memorial Museum samples. This study investigated inter-and intra-colony variation. Both tHg and tAs varied significantly by colony, but only correlated weakly with age. This highlights the potential for ōi as bioindicators of fine scale heavy metal contamination within foraging grounds. Future studies should distinguish between the different forms of Hg and As to assess true toxicity and confirm temporal trends. Furthermore, future studies should sample ōi chicks specifically to identify potential human health risks of cultural harvesting.

*MSc student

A whole-genome approach to resolve the genetic structure of Antipodean and Gibson's albatross populations

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Although seabirds are a comparatively well studied group, a major barrier to their conservation is the taxonomic uncertainty that exists across many groups. For instance, albatrosses (family Diomedeidae) have been subject to several taxonomic revisions, but debate is ongoing. Genetic datasets have been used to inform albatross taxonomy, but only a handful of low-resolution genetic markers have been used, limiting the power to delineate species boundaries. Recently, genome-wide DNA sequencing has become more accessible, and this type of genomic data can greatly improve species-level taxonomic resolution.

The Antipodean albatrosses of New Zealand presently comprise two subspecies, the Antipodean albatross (*Diomedea antipodensis antipodensis*) and Gibson's albatross (*D. a. gibsoni*). Both taxa are highly threatened, due largely to mortality associated with fisheries bycatch, and the populations continue to decline. Long-term population monitoring has revealed several differences between them; when the sex is known they can be distinguished morphologically, they have distinct foraging ranges and their breeding seasons differ temporally by several weeks, yet based on current genetic data they are considered one Evolutionary Significant Unit (ESU).

We are presently assembling reference genomes for both the Antipodean and Gibson's albatross. We have also generated genome-wide SNP data for these two subspecies and identified evidence of genetic differentiation. The findings from this study should help to better define species and population units, inform conservation management and provide fertile ground for further conservation genomic studies of albatross.

* PhD student

Conservation genomics of kuaka Whenua Hou/Codfish Island diving petrels

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Kuaka Whenua Hou/Codfish Island diving petrels (*Pelecanoides georgicus whenuahouensis*) represent an Aotearoa New Zealand endemic subspecies of the South Georgia diving petrel (*P. georgicus*). Restricted to a single colony in a 0.018 km^2 dune system, Kuaka are at risk of extinction due to climate change and population dynamics associated with small population size. In addition, kuaka have been observed to hybridise with common diving petrels (*P. urinatrix*) that co-occur on Whenua Hou. With conservation management of this seabird likely to include translocations to establish additional populations beyond the current species range, we employed whole-genome resequencing methods to assess the current extent of genomic diversity remaining in this critically endangered subspecies. We first sequenced and assembled a draft kuaka genome assembly using PacBio HiFi technology for use as a reference in population-level analyses. We then generated whole-genome resequencing for 40 kuaka and 28 common diving petrel samples collected from Whenua Hou. Following alignment of the population-level data to the draft kuaka genome assembly and additional data processing, preliminary analysis of 8556 single nucleotide polymorphisms (widely used genomic markers) reveals strong interspecific differentiation (mean F_{ST} = 0.46), and relatively lower diversity among kuaka than the more numerous and widespread common diving petrels. By determining the current baseline of genetic diversity, we will be able to understand the impacts of initial translocations on both the existing and any newly established populations, which may help to inform additional future translocations.

New Zealand storm petrel: new data on population status and genetic structure

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The New Zealand storm petrel *Fregetta maoriana* (NZSP) is classified as Threatened – Nationally vulnerable under the national threat classification scheme with only one known breeding ground on Te Hauturu-o-Toi, Little Barrier Island. This population was censused between 2015 and 2018, however, questions remain about the species that could influence its national threat status. We provide an overview of two recent population status studies seeking to ascertain the trajectory of the Hauturu population and to use population genomics to investigate the potential for cryptic populations of the species on other islands. To assess the trajectory of NZSP on Hauturu, we resurveyed the population in February 2023, five years after previous population work, using an established protocol of acoustic playback and nighttime spotlighting. Results suggest a significant increase in the observed number of storm petrels, consistent with models indicating a rapid growth trajectory for the population. The population genetic structure of NZSP was investigated using genotyping by sequencing data, which captures a snapshot (~1%) of the species' genome. Analyses were conducted on NZSP blood collected from Hauturu and at sea over 250 km north of Hauturu with the hypothesis that these distant birds could contain individuals from an undescribed population with detectable genetic structure. Analyses provided no evidence of population genetic structure, indicating that NZSP found in the Far North and on Hauturu are likely to constitute the same breeding population. Genetic diversity estimates were low with evidence of second-degree relatives sampled between locations. The overall health of NZSP and future work on this species are discussed.

Assessing offshore threats and management tools for Kuaka (Whenua Hou diving petrels) in the face of future change

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Impending environmental changes in the marine environment are expected to exacerbate pressures on many threatened species, including seabirds. Understanding of a species' ecology (including distribution, behaviour, and population dynamics) is key to assess current threats, predict future threats, and design adequate countermeasures. We combined geolocator tracking and remote sensing to identify the offshore distribution of kuaka (Whenua Hou diving petrel; *Pelecanoides whenuahouensis*) and its overlap with commercial fishing effort. We also use stable isotope analyses to quantify trophic positions of kuaka within and across years and infer their vulnerability to climate fluctuations. We then use this information, together with long-term capture-recapture data, integrated population models, and formal expert elicitations to assess: 1) potential future threats to kuaka, 2) how these threats could impact kuaka, 3) what measures could counter these threats, and 4) how effective these countermeasures might be. Results indicate kuaka consistently use Polar and Subantarctic waters south of Australia, an area currently virtually devoid of commercial fishing effort. Kuaka trophic positions also do not appear to be impacted by current climate fluctuations. Regardless, this beneficial situation is likely to change, and the kuaka population is predicted to decrease significantly (>50%) under future changes. However, countermeasures can negate this anticipated decline. Yet, the efficacy of these countermeasures heavily relies on the establishment of conservation tools in the high seas and subsequent compliance thereof. Consequently, we advocate for more effective, decisive, and transparent conservation and governance of the high seas.

Piecing together a jigsaw – assessing the present state of the northern royal albatross|toroa global breeding population

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Apart from a tiny managed breeding population on the mainland at Taiaroa Head Pukekura, Dunedin, northern royal albatross|toroa *Diomedea sanfordi* breed only on three outlying privately-owned islands in the Chatham Is archipelago: Rangitautahi (Big Sister) and Te Awanui (Middle Sister) in the Rangitatahi group (The Sisters), and Motuhara/Motchuhar (The Forty-Fours). All three islands are challenging to access regularly, making it difficult to track changes in this Nationally Vulnerable species. Individual pairs, when successful, breed biennially, further complicating efforts to monitor the population. The number of pairs nesting annually have been surveyed intermittently, in the early 1970s, mid-1990s and since 2016. This paper summarises the unavoidably sporadic mix of aerial surveys and ground counts undertaken in recent years, all at various stages in the birds' breeding cycle, to build a picture of the species' current global breeding population. The present (2020) best estimate of 6035 breeding pairs (95% confidence interval, 5734–6297), of which c. 4000 nest in any one year, represents a 37% decline from an average of 9552 pairs in the early 1990s (95% confidence interval, 8150–10,954). The reasons for the decline are briefly discussed, along with what additional information is needed to complete the population jigsaw puzzle.

A long-term regional programme to restore seabirds in Auckland: challenges, findings and perspectives

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Auckland is an internationally recognised seabird hotspot. There are 25 seabird species known to breed in this region, of which 12 (50%) are New Zealand endemic species or subspecies. However, most of these birds are 'threatened' or 'at risk', requiring urgent restoration and conservation management. This led the Auckland Council to establish the first regional government seabird monitoring and research programme, which started in late 2018. This long-term (>10 years) programme aims to increase our knowledge on the presence, health, and trends of seabird populations in the Auckland Region and the factors affecting their population distributions and trends so as to advise and develop restoration actions to improve their conservation statuses. Here we will present our approach in setting the first region-wide seabirds programme, the challenges in dealing with more than 25 species across a wide area, including remote islands, the projects we developed across the region, the fieldwork activities and the results after the first 3 years of monitoring, including after the extreme weather events of the last summer, and the exciting perspectives for the restoration of thriving seabird populations.

Seabirds as ocean indicators: migratory connectivity and stress physiology of northern common diving petrels

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A ubiquitous species in the waters of Hauraki Gulf during winter, northern common diving petrels (hereafter CDP) were thought to be resident year-round in NZ's territorial waters. Recent tracking work shows that following breeding, the species undertakes a rapid (8–13 day) migration to the south-eastern Antarctic Polar Front (APF) some 3000 km distant, presumably where they moult before returning to the Hauraki Gulf to breed. We investigated the capacity of CDPs to act as indicators of ocean conditions at the APF by matching feather corticosterone (*f*CORT) stress hormone levels to satellite derived estimates of Chl-a and sea surface temperature (SST) over the years 2014–2018. Furthermore, we used blood samples taken during breeding within the Hauraki Gulf to undertake interannual comparisons of haematological stress parameters as this has been a period with frequent marine heatwaves in the Gulf. We found a moderate relationship between productivity at the APF and *f*CORT. Small increases in mean Chl-a are potentially sufficient to reduce levels of *f*CORT in CDP as was seen in 2016. SST had no effect on *f*CORT laid down in feathers over this period. Interestingly, blood stress parameters (e.g., Mean Corpuscular Haemoglobin) of CDP breeding in the Hauraki Gulf were highest in 2016. Bird weights were also the lightest during this year. Such a finding indicates the dual information this indicator species can play, offering information about the state of breeding and non-breeding areas respectively throughout its annual cycle.

The development of a captive rearing program for tara iti

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The tara iti/NZ fairy tern is Aotearoa's rarest breeding bird. The species has been managed since 1987 but recently the total number of breeding pairs has remained stable at about 8–10 pairs. In response to a review of the programme in 2017 the Department of Conservation embarked on a structured decision-making (SDM) process to determine the optimal management for this species. This process revealed that in addition to other management components, a captive rearing programme would help to recover the population. However, captive rearing for the release of terns is challenging and as far as we are aware has only been attempted with one other species. Terns have complex foraging behaviours and usually have prolonged periods of post-fledging parental care. In 2022 proactive collection of eggs for a captive rearing programme was trialled for the second time with seven juvenile birds successfully released in early 2023. Short term indicators of success for the programme include hatching of all fertile eggs in captivity, a healthy weight of juveniles at release, and normal behaviours displayed within the aviaries. In the medium-term birds will need to survive and remain in the local area over the winter months. Success in the long term would see captive released birds contribute to the breeding population. Significant achievements to-date include the provision of live fish and chicks developing the skills to feed independently from trays and then pools of water within the aviary. However, more time is needed to assess both the medium- and long-term indicators of success.

The importance of predator control and island enhancement for tarapirohe/black-fronted tern conservation management at a historic colony on the Waiau-Uwha River

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The eastern side of New Zealand's Southern Alps, particularly in the Canterbury and Marlborough regions, is characterized by the prominent presence of braided rivers. These riverine ecosystems serve as crucial nesting grounds for a variety of native bird species, including the tarapirohe/black-fronted tern (*Chlidonias albostriatus*), contributing to 56% of their habitat range. The black-fronted tern is classified as nationally endangered and it is highly sensitive to disturbances such as predation, flash flooding and reduced breeding habitat availability due to pest-plant growth. Here we present on the annual monitoring undertaken by Wildlife Management International Limited (WMIL) of black-fronted terns on a specific colony along the Waiau-Uwha river in North Canterbury. The colony, colloquially known as Shark's Tooth, has been monitored since 2017 and has received a variety of management approaches. Black-fronted terns have selected this site for breeding five times in the last six seasons, despite a <10% breeding success rate each year. We discuss implementations that took place during the 2022/2023 breeding season at Shark's Tooth to help increase black-fronted tern breeding success at this historic site including island enhancements (elevation, channel widening, and weed removal), predator control, camera trapping and chick shelter trials. We discuss how this impacted this local black-fronted tern colony, and how these implementations could assist in the wider species conservation management across Aotearoa New Zealand.

Monitoring a cultural harvest: trends in kuruwhengi/Australasian shoveler population, 2000–2022

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Shoveler is a game species and can be hunted annually during a 4– to 6–week season subject to conditions imposed by regional Fish and Game Councils. Fish and Game monitors the size of annual harvests, and to ensure harvests are sustainable, it conducts annual counts of pre-breeding populations to determine annual change and long-term population trend. I report results of counts conducted between 2000 and 2022. Four indices were examined: (1) total national count; (2) the sum of counts from 75 sites that have been counted in every year; (3) a 2-year (2021–2022) comparison; and (4) a 23-year trend (2000–2022). All indices point to a decreasing population. The 2022 total count was 11.6% lower than for 2021. The long-term trend count indicates a small annual decrease (mean 2.9%). Counts in 2022 from sites counted every year were the second lowest since 2000. National shoveler harvest data also indicate the population may be decreasing. 2022 is the first year in which the long-term trend has turned negative; hitherto the trend has been neutral. Shoveler harvest and the Southern Oscillation Index (SOI; indicative of rainfall quantity and distribution, and temperature), explain changes in the counts at sites counted each year. This model indicates that a 10% increase in harvest induces a 7% reduction in the count following that harvest, while a 10% increase in the prevailing annual SOI index coincides with a 4% increase in the count. Management responses to monitoring outcomes will be discussed.

Waterbird surveys in the upper Waikato River and Lake Ōhākurī and Lake Arapuni: 2012–2019

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Mercury NZ Ltd (Mercury) holds resource consents to operate the Waikato Hydro Scheme and is required to undertake five-yearly bird breeding surveys to assess wetland bird abundance and breeding success for riverine sections (Taupō gates to Lake Ōhākurī) and the Arapuni and Ōhākurī reservoirs. This work began in 2003 with surveys at various times of the year on eight occasions. This assessment reports on results of surveys since 2012 and when regular surveys have occurred at the same time of year (early November) in 2012, 2017, 2018, and 2019. The surveys have shown the high importance of the lakes and river habitats for both riverine and lacustrine avifauna species and patterns of distribution between these major habitat types. The most common species observed during earlier surveys – māpunga/black shag, kawaupaka/little shag, kakīānau/black swan, mallard, and pāpango/New Zealand scaup – remained abundant between 2012 and 2019. Collection of long-term data on the abundance of bird populations provides extremely useful information on trends in populations. The three consecutive years of surveys (2017–2019) have been very useful, to enable testing for population changes for the most abundant water bird species showing that the populations of all species assessed are reasonably stable. It has also illustrated key preferences for particular species for some of the independent survey sites. Some species have higher abundances associated with riparian habitat (e.g., mallard and pūtangitangi/paradise shelduck), while others have shown a preference for lacustrine habitats (e.g., pāpango and kawau tūī/little black shag).

Sex differences and effects of migration on intake rates of bar-tailed godwits

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Birds undertaking long-distance migratory flights drastically change their body composition during flight, including through the catabolism of internal organs. Consequently, the gastro-intestinal (GI) tracts of birds making long-distance flights are expected to be substantially reduced on arrival. Given links between the size of the GI tract and its processing ability, newly arrived birds may face impaired food processing ability. Here we test for carry-over effects of migration on diet and energy intake in individually marked bar-tailed godwits (*Limosa lapponica baueri*) upon arrival from an ~11,000 km flight from Alaska to New Zealand. First, using field video-recordings, we explored how foraging varied with bill length (which varies greatly both within and between the sexes – females are larger). Males had slightly higher and less variable intake rates and took mainly small, surface-dwelling prey such as the small mud snail *Potamopyrgus*, while longer-billed birds (females) took more deeply buried worms. However, individual specialisation was also evident—almost half the males specialised on *Potamopyrgus* while one female specialised on polychaete worms, and other prey were taken non-randomly by certain individuals. We then tested for changes in diet and intake rate with time since arrival from migration. We found evidence for a slight increase in intake rates over time and an increase in the intake of the hard-shelled mud snail *Amphibola crenata.* This increase in mud snail consumption is consistent with an increase in gizzard mass and strength with time since arrival. Overall, however, changes with time were small and there was no indication that the 8–10-day flight resulted in substantial impairment of foraging ability. This may be because godwits at the study site had a broad diet that also included small or soft items that would be easily processed even with a reduced GI tract. Bar-tailed Godwits, despite making the longest non-feeding flight documented among birds, showed no obvious behavioural or dietary carry-over effects after migration.

POSTER

Using of geostatistical tools for characterising the spatial and temporal distribution of the iconic New Zealand fantail in Tiritiri Matangi Island

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Dramatic fluctuations of island populations of the iconic New Zealand fantail (*Rhipidura fuliginosa*) led to the development of a Geographic Information System to characterise the spatial and temporal distribution of the species on Tiritiri Matangi Island. A pilot sampling grid was designed and implemented for data collection and monitoring. Fantail presence data was recorded at different seasons for three years by volunteers assigned to specific grids. Spatial distribution characteristics were determined using ArcGIS tools Hotspot Analysis, Cluster and Outlier Analysis and Ordinary Least Squares. The Species Distribution Modelling tool Maxent was used to determine area suitability using as inputs count data and environmental variables consisting of tracks, slope, aspect and vegetation types. Occupancy Modelling was also conducted to describe occupancy and detection probabilities over the island. Results show distinctive differences between the sampling periods as well as different areas of the island. Maxent modelling identified vegetation, particularly replanted areas, as the significant environmental factor influencing the model during November and the presence of tracks showing the most influence in May. Suitability maps and occupancy models further described the seasonal spatial characteristics of the species. The GIS based approach was determined to be a convenient means of data collection and the maps produced highlighted the spatial characteristics of the species. This approach was also found to be useful in supporting volunteer-based systematic collection of other important data on other species and environmental factors in the island and in other areas with similar research or monitoring requirements.

POSTER

Understanding the evolutionary origin of the Manawatāwhi Three Kings Islands toroa Buller's albatross

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Toroa albatross are almost as large as the controversy surrounding their evolutionary relationships and number of species. Through analysis of morphological and genetic data, there are currently two recognised subspecies of Buller's albatross: *Thalassarche bulleri bulleri*, which breeds on Rekohu Chatham Islands and *T. b. platei*, which breeds on the Snares and Solander Islands. However, the evolutionary origin and taxonomic status of the Manawatāwhi Three Kings Islands population of Buller's albatross that was only discovered in 1983 remains unresolved. Currently, birds from Manawatāwhi are considered to be *T. b. bulleri* based on their similar breeding timing — Chatham Island and Manawatāwhi birds both appear to breed several months earlier than their southern counterparts. Building upon previous genetic research of the Chatham and Snares populations, this study will conduct new genetic analyses of all Buller's albatross breeding sites using nuclear genotyping by sequencing and mitochondrial genomes to resolve the evolutionary history of this taonga species. Our research will help resolve the taxonomic status of the Manawatāwhi population and inform evidence-based kaitiakitanga of toroa by tangata whenua and conservation providers.

*Master's student

POSTER

Migratory movements, distribution, habitat preference, and activity patterns of the Critically Endangered Abbott's booby

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The Abbott's booby *Papasula abbotti* is one of the most threatened seabirds in the world. The species' only current breeding location is Christmas Island, Australia, in the eastern Indian Ocean. There, Abbott's boobies benefit from conservation action but the species' migratory behaviour and distribution are largely unknown, impeding the identification and quantification of threats birds are exposed to during this period. We studied migratory movements of Abbott's boobies using geolocator-immersion loggers. A total of 22 adult birds were tracked for an average of 714±185 days between 2007 and 2014, yielding 27 migratory trips. The birds migrated 2,531±600 km, predominantly (90%) East of Christmas Island to an area centred around the Banda Sea, Indonesia (50% Utilisation Distribution ~1,317,500 km²). Birds were away from Christmas Island for a mean duration of 121±21 days, leaving around 7 December (±29 d) and returning around 7 April (±27 d). This migration coincides with the Indonesian-Australian monsoon, a period characterised by reversing prevailing winds and decreased regional oceanic primary productivity. No spatial segregation was observed during migration between males and females or failed and successful breeders; however, males reached their non-breeding range earlier than females. During their migration, Abbott's boobies spent little time on water during the day or at night (15%). Overall, these novel results identify the areas within which potential threats should be investigated, e.g., interactions with fisheries or effects of climate change on the species' marine habitats, which could inform marine spatial planning.

*PhD student

POSTER

Surveying albatrosses on remote islands – examples of northern royal albatross and northern Buller's mollymawk on the Chatham Islands

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Intermittent surveys have been carried out in recent years of the breeding populations of northern royal albatross (*Diomedea sanfordi*) and northern Buller's mollymawk (*Thalassarche bulleri platei*) on three islands in the Chatham Islands archipelago. These include ground-based and aerial photographic surveys conducted from a light aircraft and, more recently, on one island, by a drone. These surveys aim to establish reasonably accurate estimates of these species' populations but are complicated by difficulties of access, timing of aerial surveys, and year-to-year variations in conditions on the islands. This poster introduces some of the approaches used to acquire and analyse the relevant information; the various sources of bias and uncertainty that exist; and how these might be addressed. Points for discussion include the merits and drawbacks of continuing to attempt regular whole-island surveys in contrast to monitoring permanent sample plots (interspersed with less frequent whole-island counts); the advantages and disadvantages of ground counts, aerial photographic surveys, and drone-derived imagery; and the trade-off between adopting a consistent approach to monitoring these populations versus investing more time, effort and money in trying to reduce uncertainty in the population estimates. What are the opportunity costs, and what mix of approaches would best serve conservation interests?

POSTER

Catching birds at sea – a tool for conservation

The use of net guns for the live capture of seabirds

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There is a long history of collecting birds at sea across the world's oceans. Through the 19th and 20th centuries collecting of specimens for research was done mostly by shooting them from a boat, as in 'the bird sampling was conducted using a shotgun'. More recently seabird researchers concerned about more ethical approaches to sampling have driven the development of net-guns for live capture. Live capture of birds at sea using a variety of techniques has been adopted for research purposes, the most common being hoop and throw nets. This technique works well for larger confiding birds that gather close to a boat attracted by chum. However, less confiding birds have proved to be a challenge. Net guns have been used for live wildlife capture in New Zealand for years – wild deer and deployed from helicopters, also capturing kea. This presentation follows the evolution of net guns for the live capture of seabirds in New Zealand, initially for the purpose of capturing New Zealand storm petrels, then refined for the capture other storm petrels and larger petrels, shearwaters, and shags both here in New Zealand and overseas. It will cover how net guns can be deployed successfully in a variety of situations and conditions; subsequent handling of birds that have been caught using this method including processing birds on board a boat, followed by safe release. Results to date include, determining taxonomic status including describing a new species, finding breeding locations for cryptic species, determining foraging distribution during migration of poorly known species, and overlap with marine threats for endangered species. Eight taxa have been successfully captured using net guns to date.

POSTER

Reinventing wildlife tracking for the 21st Century – Improving the efficiency of radio telemetry

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VHF radio telemetry is a great tool for locating and monitoring wildlife—especially in forested landscapes where other methods are unsuitable—but the equipment hasn't changed much since the 1980s. Traditional single-frequency receivers can monitor only one frequency at a time. However, sequentially scanning through a list of frequencies wastes time, and if the receiver is moving you risk missing unmonitored frequencies. There has to be a better way! Here I describe the development of new Multi-Track receiver technology which revolutionises conservation research, especially for aerial tracking. The receiver monitors 500 frequencies simultaneously (instead of requiring sequential scanning), and it automatically determines positions without the need for triangulation. The system can track while moving, and without needing to hover and rotate, which is ideally suited for efficient aerial tracking. Unlike standard radio receivers, it also logs positions for easy spatial analysis, and comparisons over time.

Tracking from the air using aircraft or Unmanned Aerial Vehicles (UAVs, or drones) offers many advantages over traditional ground-based survey and research techniques, and different platforms provide different benefits. As well as making fieldwork faster, safer, and more efficient, the technology doesn't require and any manual input so supports fully-automated searches for simplicity and repeatability. I discuss the evolution of this technology for applied conservation, and present results comparing the efficiency of different tracking methods for locating different species, including cryptic nesting penguins and forest birds.

POSTER

The impact of eradication aimed predator control on urban native birds

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Predator Free New Zealand's goal of eradicating rats (*Rattus spp.*), possums (*Trichosurus vulpecula*) and stoats (*Mustela erminea*) by 2050 expands on the successes of local predator control initiatives by bringing it to a national scale with a myriad of anticipated benefits to native biodiversity. Wildlife Management International Ltd. is supporting Predator Free Wellington's aims to eradicate possums, rats, and mustelids from the Miramar Peninsula and become the first predator-free capital city in the world by providing technical advice and ground-based staff. Phase one of the eradication on the Miramar Peninsula has successfully removed all stoats, weasels (*Mustela nivalis*), and Norway rats (*R. norvegicus*), and is currently targeting the final fragmented population of ship rats (*R. rattus*). While not yet fully pest-free, we present on how the intensive predator control that has occurred since June 2019 has facilitated a significant rise in numbers of many native and endemic bird species on the Miramar Peninsula, especially pīwakawaka/New Zealand fantail (*Rhipidura fuliginosa*) and riroriro/grey warbler (*Gerygone igata*). We share citizen science data and anecdotal stories from the local community that support the results of formal 5-minute bird counts undertaken by Wellington City Council and Greater Wellington Regional Council. Increases have been noticeable via local residents who share stories of seeing tūī (*Prosthemadera novaeseelandiae*), kererū/New Zealand pigeon (*Hemiphaga novaeseelandiae*), kārearea/New Zealand falcon (*Falco novaeseelandiae*), kākāriki/red-crowned parakeet (*Cyanoramphus novaezelandiae*), kākā (*Nestor meridionalis*), and ruru/morepork (*Ninox novaeseelandiae*) for the first time in years. The use and value of citizen science platforms, notably eBird, has been evident. Even though not completely free of rats yet, we reveal how this eradication project has allowed native and endemic bird species to increase in number and distribution, much to the delight of the Miramar community and key stakeholders of the project.