Article

Fixing the Pakaru Pipeline: Some recommendations for Change

Sereana Naepi[1]*, Tara McAllister[2], Reremoana Theodore[3], Jesse Kokaua[4], Hine Funaki-Cole[5], Kate Jack[1]

[1]School of Social Sciences, University of Auckland
[2]Te Manawahoukura, Te Wānanga o Aotearoa
[3]Department of Psychology, University of Otago
[4]Division of Health Sciences, University of Otago
[5]Te Kura Mahinga Tangata, School of Social and Cultural Studies, Te Herenga Waka - Victoria University of Wellington

Māori and Pacific people remain under-represented in our research sector. There have been recent efforts to address this particular workforce issue including targeted research funds, and fellowships. However, these efforts do not currently take into account where Māori and Pacific people are. Instead, they reflect a desire for where the government want Māori and Pacific to be. While this targeting is useful for driving Māori and Pacific people into STEM, it does leave the majority of Māori and Pacific in precarious and unsustainable career pathways. This paper considers where we currently find Māori and Pacific doctorates, where Māori and Pacific people are graduating from and finally makes recommendations for a whole of system approach while continuing to support Māori and Pacific scholars in STEM.

Introduction

In recent years, Aotearoa New Zealand's research sector has made significant commitments to addressing inequity in the research system. This change is necessary as research (McAllister, Naepi, Wilson, Hikuroa and Walker, 2020; McAllister et al., 2022) and government (MBIE, 2022, PBRF Review Panel, 2020) have highlighted that unless significant structural change occurs, the research system will continue to entrench inequity. We have seen a shift in focus from primarily students to the entire research ecosystem, enabling different conversations about how the research sector functions and alternative ways to address inequity within the system. Naepi et al. (2019) argued that the academic pipeline is fundamentally pakaru (broken/shattered) for Māori and Pacific graduates in higher education. This paper revisits this idea to focus on where the broken pieces are and how to focus resources for change.

As a starting point, it is clear Māori and Pacific people remain under-represented in Aotearoa New Zealand's research workforce (MBIE, 2022; PBRF Review Panel, 2020). The potential to grow this workforce is currently restricted by, among other things, the highly limited numbers of Māori and Pacific doctorates, and though these numbers are increasing, progress has been slow. Based on these rates of change and population forecasts, a research workforce representative of Aotearoa New Zealand's general population, would, as of 2020, take 73 years to achieve for Māori and 127 for Pacific peoples (PBRF Review Panel, 2020, pp. 32).

The broad reasons for this inequity are myriad but include lower participation in education and poorer education outcomes, structural and overt discrimination within education, and a hesitance by institutions to address these issues (McAllister et al., 2019; Naepi, 2019). More specifically, the process of transitioning into the academic workforce has been identified as difficult to navigate. Funding structures, largely merit-based, have been noted as disincentivising long-term, community-oriented, interdisciplinary research and being incompatible with tikanga Māori through the way they require certain forms of competitive production and narrow assessment (PBRF Review Panel, 2020, pp. 33; MBIE, 2023a; McAllister and Dalla Riva, 2023). Earlier research has highlighted the lack of Māori and Pacific academics in universities (McAllister et al., 2019; Naepi, 2019). Importantly, once Māori and Pacific academics enter the university system, they are less likely to be promoted, remunerated fairly (McAllister, Kokaua, Naepi, Kidman and Theodore, 2020) and employed in senior positions (McAllister et al., 2019; Naepi, 2019). Further, despite obligations, RSI policies neglect to incorporate Te Tiriti and so struggle to attract and retain Māori and Pacific people (MBIE, 2022). As MBIE (2022) notes, there is concern about "how these structures and processes affect the precarity and attractiveness of research careers and generate a lack of diversity" (pp. 26). Although funding is not the sole cause of these problems, it presents an opportunity to contribute towards a more representative and equitable

*Correspondence: s.naepi@auckland.ac.nz

research workforce in Aotearoa New Zealand, and moves are slowly being made to begin doing so.

The changes in resource investment in addressing inequity in Aotearoa New Zealand's research workforce are targeted in multiple areas. Changes to the RSI funding system are underway and planned over the next three years. These changes include investing in the development of the Māori STEM workforce pipeline, supporting research led by Māori and Māori and Pacific fellowships to improve equity (MBIE, 2022). At the time of writing (2023), major changes had been recommended to the PBRF process.[1] Introducing the concept of 'merit relative to opportunity' was intended to match concurrent efforts to reduce systemic inequity in assessment outcomes. Notably, the funding weighting for Māori and Pacific people evidence portfolios would have become '2' for a funded Quality Category and '4' for a C(NE) Quality Category, and a subject-area weighting of '2.5' to both the Māori Knowledge and Development subject area and the Pacific Research subject area. These changes meant that a Māori/Pacific portfolio submitted would get double the funding of the similar quality portfolio submitted by a non-Māori/Pacific scholar. These amendments would incentivise institutions to address the under-resourcing of Māori and Pacific research and researchers (PBRF Review Panel, 2020). Creating further strong financial incentives will support institutions to progress in their development of a diverse workforce and research pipelines (PBRF Review Panel, 2020).

To determine where limited resources need to be invested, it becomes important to understand where Māori and Pacific doctoral students have been, are, and where graduates will be. Previous work highlights problems with the wider pipeline and how it is failing Māori and Pacific researchers (McAllister et al., 2019; Naepi, 2019; Naepi et al., 2019, 2021). While several reports (Universities New Zealand, 2022) aim to detail this, our paper situates these numbers in the wider academic discourse and offers potential policy recommendations and considerations. Importantly, as a team of Māori and Pasifika researchers with expertise in higher education, we can apply an equity lens to the interpretation of Māori and Pacific peoples' administrative data on PhD enrolments.

Method

This was a national cross-sectional study using data and analyses sourced from Universities New Zealand dashboards which used tertiary enrolment data from New Zealand's Integrated Data Infrastructure (Statistics New Zealand, 2017). The IDI is a large, population-level database containing administrative and survey data, linked at the individual level, and curated by Statistics New Zealand (Milne et al., 2019; Statistics New Zealand, 2017).

Participant population

The participants were doctoral students enrolled at a New Zealand University by year of study 2003 and 2020. This study included only domestic students regardless of which stage of their PhD they had reached. All numbers have been rounded up to three by Universities NZ.

Primary measures

We explored data from the IDI for individuals who self-identified as Māori or Pacific and were enrolled in a PhD. We employed the Total concept approach to ethnicity data, which permits individuals to identify with multiple ethnic groups.

Faculty groupings are based on enrolled subjects from the tertiary enrolment dataset in the IDI. Universities NZ used Quacquarelli Symonds (QS) ranking classification of subject areas for grouping into faculties (Universities New Zealand, 2022). Arts & Humanities include subjects like Music, Performing Arts, Architecture and Design, Fine Arts, Media Studies, and Creative Arts. Engineering & Technology includes subjects like Surveying, Mapping Science, Engineering (Electrical, Environmental, Biomedical, Computer, Mechanical, Structural, etc.) and Technology. Life Sciences & Medicine subjects include Biochemistry, Cell Biology, Marine Science, General Medicine, Surgery, Midwifery, Veterinary Science, Dentistry, Microbiology, Ecology, Evolution, and Public Health. Natural Sciences include Mathematics, Statistics, Chemistry, Geology, Geophysics, Hydrology, Soil Sciences, Hydrology, Physics, Astronomy, Medical and Forensic Science, Pharmacology, and Soil Science. Social Sciences & Management include Teacher Education, Māori Education, Tourism, Accounting, Human Resource Management, Marketing, Sociology, History, Art History, Human Geography, Political Science, Law, Linguistics, Economics, Religious Studies, and Te Reo Māori. 'Unknown' included subjects like Whānau Education, Career Development Programmes and people in Mixed Field Programmes and other subjects not further defined.[2]

Procedure and analysis

Data were accessed through the Universities NZ website link to doctoral students and their outcomes (Universities New Zealand, 2022). All Statistics New Zealand confidentiality requirements were adhered to, including rounding to base 3 and suppression of counts less than six. All analyses in this study are descriptive and undertaken in MS Excel and graphically presented using R. The data visualisation colour palette used was Manu – NZ native bird palette (Thomson, 2022).

Results

How many Māori and Pacific doctoral students are there?

The total number of Māori doctoral enrolments has increased from 213 in 2000 to 663 in 2020 (Figure 1A). The

[1] In March 2024 the Government announced that the upcoming PBRF process would not proceed: https://www.tec.govt.nz/news-and-consultations/university-advisory-group-established-and-pbrf-quality-evaluation-2026-cancelled. At the time of publication a replacement has not been announced.

[2] A comprehensive list of all subjects in each of the faculties can be found at https://www.universitiesnz.ac.nz/latest-news-and-publications/doctoral-students-and-their-outcomes.

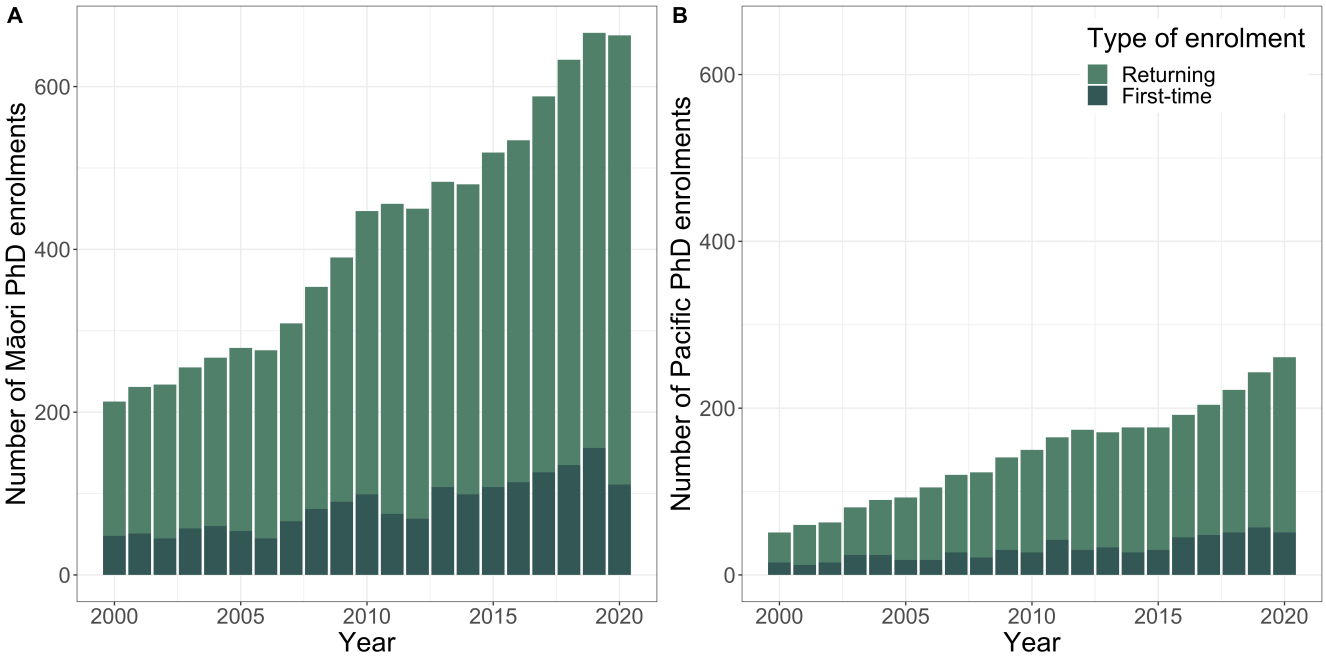

Figure 1: The total number of Māori (A) and Pacific (B) PhD enrolments across all tertiary education providers (including wānanga) from 2000 to 2020.

number of Māori enrolling in a PhD programme for the first time also increased between 2000 and 2019, from 48 to 156 and decreased slightly in 2020 to 111 (Figure 1A). The number of Pacific enrolments follows a similar pattern, but on a smaller scale than Māori. The total number of Pacific doctoral enrolments has also increased over time from 51 in 2000 to 261 in 2020 (Figure 1B). The number of Pacific first-time enrolments has increased from 15 to 51 over two decades, with a slight decrease from 2019 (57) to 2020 (51; Figure 1B).

What faculties are Māori and Pacific doctoral students in?

Māori doctoral faculty of enrolment enables us to see where the Māori doctoral population is currently enrolled. Most Māori and Pacific doctoral enrolments are in the Social Sciences & Management (Figure 2). This percentage has varied from 63 to 69% for Māori and 57 to 67% for Pacific between 2003 and 2020 (Figure 2). The percentage of Pacific doctoral students in Engineering & Technology has decreased substantially over time, from 11% in 2003 to 3.4% in 2020 (Figure 2B). It is important to keep in mind that the relatively small numbers of students enrolled in these spaces can cause dramatic shifts. The percentage of Māori doctoral students in Natural Sciences, Life Sciences and Engineering & Technology faculties has remained stagnant over time (<2% change from 2003 to 2020; Figure 2A).

How has the number of first-time Māori and Pacific doctoral enrolments changed by faculty?

Doctoral first-year faculty enrolments enable us to see where new Māori and Pacific doctorates enter the system. Most first-year Māori and Pacific doctoral enrolments continue to be in the Social Sciences & Management (Table 1). Over a period of 17 years, Māori first-time enrolments in Social Sciences & Management faculties has doubled from 15 (2003) to 30 (2020; Table 1). Similarly, it has increased by 24 enrolments for Pacific peoples (Table 1.

The number of first-time Pacific enrolments has not changed between 2003 and 2020 for Engineering & Technology or Natural Sciences. For Māori first-time enrolments, natural sciences have increased slightly from 0 (2003) to 3 (2020). While engineering and technology has seen a minor decrease from 9 (2003) to 6 (2020; Table 1). It is important to note that these changes by three could represent changes of a single student because all numbers above zero are rounded up to factors of three.

		Year		
	Faculty	**2003**	**2020**	**Change**
Māori	Arts & Humanities	0	9	9
	Engineering & Technology	9	6	-3
	Life Sciences & Medicine	9	30	21
	Natural Sciences	0	3	3
	Social Sciences & Management	39	63	24
Pacific	Arts & Humanities	0	6	6
	Engineering & Technology	6	6	0
	Life Sciences & Medicine	0	9	9
	Natural Sciences	0	0	0
	Social Sciences & Management	15	30	15

Table 1: The number of Māori and Pacific first-time doctoral enrolments in each faculty between 2003 and 2020. All numbers have been rounded up to the nearest factor of three.

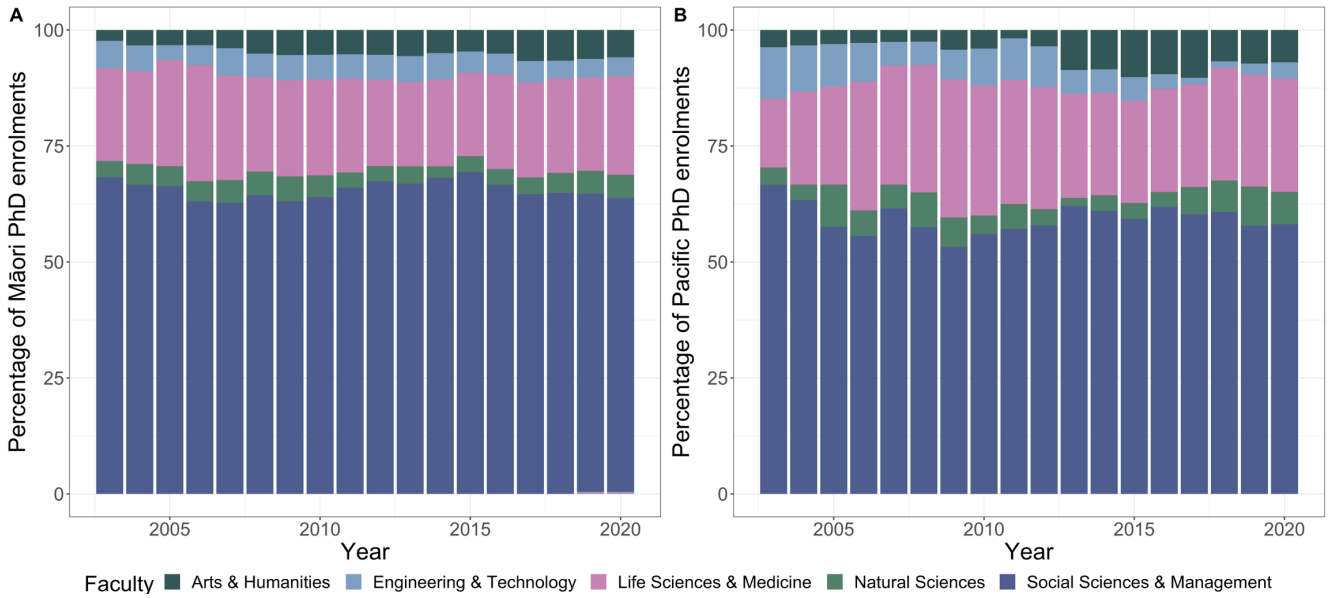

Figure 2: The percentage of Māori (A) and Pacific (B) PhD students enrolled by faculty over time. See methods for a description of the subjects comprising each faculty groupings.

Discussion

Current workforce investment directions reflect a desire to address inequity across the sector. However, a gap remains between where this investment is targeted and where Māori and Pacific doctoral students are (field of study). While this reflects a desire to move Māori and Pacific people into STEM careers by funding STEM research, it remains that very few Māori and Pacific scholars will be eligible to access these funds resulting in a shortfall to address inequity as the Māori and Pacific workforce development pipeline is designed to support spaces where most Māori and Pacific people are not. While it is admirable and much needed that we are investing in spaces to shift Māori and Pacific scholars into STEM, what remains unanswered is how we will support and create stable pathways for Māori and Pacific scholars who are enrolled outside of STEM.

While the government continues to invest in STEM-related fields to drive innovation alongside economic productivity and diversification, this data shows that most Māori and Pacific doctorates are not in these fields. A robust equity approach would consider both the short and long-term investments that can be made to provide equitable pathways for those in the system now whilst simultaneously encouraging more Māori and Pacific people into STEM careers to drive longer positive economic outcomes.

This paper is not an argument for shifting funding from workforce development into recruitment for Māori and Pacific people in STEM in compulsory education. In fact, this data shows that over two decades of investment into this has had minimal impact and that perhaps that part of policy needs a rethink in its delivery in and of itself. Instead, this paper argues that future policy shifts must be cognizant of where Māori and Pacific scholars are, have been and are predicted to be, or these will inevitably fail at addressing sector-wide inequity concerns.

The recently announced Ngā Puanga Pūtaiao Fellowships include 20 fellowships for early and mid-career Māori and Pacific STEM researchers. Although data is available on the number of Māori and Pacific researchers who have completed PhDs in this time, the numbers are grossly inflated as current records employ a practice of rounding up to five for any number between one and five. This means that there could be anywhere between 34-130 (early career) and 62-230 (mid-career) Māori and Pacific researchers eligible for the Ngā Puanga Pūtaiao Fellowships.

Suggested policy shifts

Naepi et al. (2019) argued that the academic pipeline is fundamentally pakaru for Māori and Pasifika graduates in higher education. Pakaru in te reo Māori translates to "broken, shattered" (Williams, 1971, pp. 251). With this understanding, the pipeline metaphor does not simply have small leaks or a single break but is shattered into many pieces. One approach, then, will not be sufficient to address the issues. We, therefore, offer recommendations for multiple approaches towards policy shift. This will take a whole sector approach that is focused on rebuilding pipelines for highly qualified Māori and Pacific. Future policy announcements must consider the long-term and short-term impact for Māori and Pacific and will require a cross-ministry approach to change. These suggestions include:

- The Ministry of Education and Ministry of Business Innovation and Employment hold sector-wide (compulsory and higher education, research institutions and businesses) talanoa to develop both a long and short-term sector-wide STEM solution;
- Future fellowship design considers where Māori and Pacific are enrolled currently, and where they will be enrolled in the future;

- A workforce approach that enables pathways for Māori and Pacific social science and humanities doctoral students to address current enrolment patterns;
- The development of a sector-wide anti-racist policy that can be certified in different employment and institutional settings.

The above recommendations are timid in request, but they are recommendations that are plausible within the current imaginary of the system. These are not unimaginable policy shifts; they are within reach if there is a willingness for change within the sector.

References

McAllister, T. G. and Dalla Riva, G. (2023), 'Does the Ministry of Business, Innovation and Employment's Endeavour Fund deliver on diversity?', *Journal of the Royal Society of New Zealand* **53**(2), 244–250. https://doi.org/10.1080/03036758.2022.2071952

McAllister, T. G., Kidman, J., Rowley, O. and Theodore, R. F. (2019), 'Why isn't my professor Māori? A snapshot of the academic workforce in New Zealand universities', *MAI Journal* **8**(2), 235–249. https://doi.org/10.20507/MAIJournal.2019.8.2.10.

McAllister, T. G., Kokaua, J., Naepi, S., Kidman, J. and Theodore, R. (2020), 'Glass ceilings in New Zealand universities: Inequities in Māori and Pacific promotions and earnings', *MAI Journal* **9**(3), 272–285. https://doi.org/10.20507/MAIJournal.2020.9.3.8

McAllister, T. G., Naepi, S., Wilson, E., Hikuroa, D. and Walker, L. A. (2020), 'Under-represented and overlooked: Māori and Pasifika scientists in Aotearoa New Zealand's universities and crown-research institutes', *Journal of the Royal Society of New Zealand* **52**(1), 38–53. https://doi.org/10.1080/03036758.2020.1796103

McAllister, T., Naepi, S., Walker, L., Gillon, A., Clark, P., Lambert, E., Alana B. McCambridge, C. T., Housiaux, J., Ehau-Taumaunu, H., Connell, C. J. W., Keenan, R., Thomas, K.-L., Maslen-Miller, A., Tupaea, M., Mauriohooho, K., Christopher Puli'uvea, H. R., Nicholas, S. A., Pope, R.-N.-A.-R., Sangata A. F Kaufononga, K. R., Fleury, K., Camp, N., Carson, G. M. R., Kaulamatoa, J. L., Clark, Z. L., Collings, M., Bell, G. M., Henare, K., Reiri, K., Walker, P., Escott, K.-R., Jaye Moors, B.-J. W., Laita, O. S., Maxwell, K. H., Fong, S., Parata, R., Morgan Meertens, C. A., Taura, Y., Haerewa, N., Lawrence, H., and Alipia, T. (2022), 'Seen but unheard: navigating turbulent waters as Māori and Pacific postgraduate students in STEM', *Journal of the Royal Society of New Zealand* **52**(sup1), 116–134. https://doi.org/10.1080/03036758.2022.2097710

Milne, B. J., Atkinson, J., Blakely, T., Day, H., Douwes, J., Gibb, S., Nicolson, M., Shackleton, N., Sporle, A. and Teng, A. (2019), 'Data Resource Profile: The New Zealand Integrated Data Infrastructure (IDI)', *International Journal of Epidemiology* **48**(3), 677–677e. https://doi.org/10.1093/ije/dyz014

Ministry of Business, Innovation, and Employment (2022), 'Te Ara Paerangi Future Pathways White Paper'. https://www.mbie.govt.nz/science-and-technology/science-and-innovation/agencies-policies-and-budget-initiatives/te-ara-paerangi-future-pathways/te-ara-paerangi-future-pathways-white-paper/white-paper/

Ministry of Business, Innovation and Employment (2023), 'Exploring the use of government RSI funding for Māori'. https://www.mbie.govt.nz/assets/government-investment-in-maori-research-science-and-innovation.pdf

Naepi, S. (2019), 'Why isn't my professor Pasifika?', *MAI Journal* **8**(2), 219–234. https://doi.org/10.20507/MAIJournal.2019.8.2.9

Naepi, S., McAllister, T. G., Thomsen, P., Leenen-Young, M., Walker, L. A., McAllister, A. L., Theodore, R., Kidman, J. and Suaaliia, T. (2019), 'The Pakaru 'Pipeline': Māori and Pasifika Pathways within the Academy', *New Zealand Annual Review of Education* **24**, 142–159. https://doi.org/10.26686/wgtn.12592181.v1

Naepi, S., Wilson, E., Lagos, S., Manuela, S., McAllister, T. G., Kidman, J., Theodore, R. and Kokaua, J. (2021), 'Where are we now? Patterns of Māori and Pasifika enrolment in the Natural and Physical Science and Society and Culture fields in Aotearoa New Zealand', *Higher Education Research & Development* **40**(1), 90–103. https://doi.org/10.1080/07294360.2020.1857345

PBRF Review Panel (2020), 'E koekoe te tūī, e ketekete te kākā, e kūkū te kererū - Toward the Tertiary Research Excellence Evaluation (TREE)'. https://assets.education.govt.nz/public/Documents/Further-education/PBRF-Review/The-Report-of-the-PBRF-Review-panel-E-koekoe-te-tuie-ketekete-te-kaka..-.pdf

Statistics New Zealand (2017), 'Integrated Data Infrastructure 2017'. http://archive.stats.govt.nz/browse_for_stats/snapshots-of-nz/integrated-data-infrastructure.aspx

Thomson, G. (2022), 'Manu: NZ Bird Colour Palettes. R package version 0.0.2'. https://github.com/G-Thomson/Manu

Universities New Zealand (2022), 'Doctoral Students and their Outcomes'. https://www.universitiesnz.ac.nz/latest-news-and-publications/doctoral-students-and-their-outcomes

Williams, H. W. (1971), *Dictionary of the Maori language*, GP Publications Limited.