



## Ka mua, ka muri: the inclusion of mātauranga Māori in New Zealand ecology

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**Abstract:** Globally, there is growing recognition of the benefits that indigenous peoples can bring to ecology and conservation, drawing on deep spiritual and cultural ties to the environment. The contribution of indigenous peoples and their knowledges is now widely acknowledged as critical to successful efforts to mitigate anthropogenic impacts. In New Zealand, mātauranga spans all aspects of indigenous Maori knowledge and is conceptualised, developed and maintained through practice and connection. We searched all issues of the Proceedings of the New Zealand Ecological Society and the New Zealand Journal of Ecology from 1953 to 2018 to identify and highlight papers that feature research partnerships with Maori and/or acknowledge and explore mātauranga Maori in a meaningful way. There were only three, republished here in this virtual issue. Although there has been a recent increase in studies that incorporate mātauranga Maori published in other journals, we argue that substantive commitment to community partnerships and bicultural research has not been realized in ecological research. Working with interdisciplinary knowledge including mātauranga will be critical to halt further biodiversity loss and improve outcomes for the environment and people, in New Zealand and worldwide. Mātauranga Maori has much to contribute to positive biodiversity and ecological outcomes, but it will require institutional and systemic support of scientific researchers to develop authentic partnerships with Maori communities to transform research practices.

**Auheke:** Ko te ahurea, te mātauranga me te wairuatanga o ngā iwi taketake ngā aho e whakamana ana i te hiranga o ēnei iwi ki ngā mahi tiaki taiao, ki ngā mahi mātai hauropi. Mo ngā iwi taketake o te ao, i ahu mai te mātauranga i ō rātou hononga ā-wairua ki te taiao, i ō rātou rawekeweke i te ao kikokiko. Mā ēnei momo mātauranga ka pērā ki tō te iwi Māori, ngā kino hauropi e whakamāuru. I whāia e mātou ngā tuhinga roa e hāngai ana ki te Māori me tōna mātauranga ki roto i te whakaputanga o te Proceedings of the New Zealand Ecological Society me te New Zealand Journal of Ecology mai i te tau 1953 ki te tau 2018. E toru noa iho ngā tuhinga roa i kitea i te mutunga mai o tō mātou mahi rangahau. Ahakoa kua nui haere ngā tuhituhinga e hāngai ana ki te mātauranga Māori, e whakapono ana mātou me kaha ake te whakamana i te mātauranga Māori ki roto i ngā mahi rangahau mātai hauropi. Waihoki, me whakawhanake hoki ngā kaupūtaiao ki te hāpai i te mātauranga Māori ki roto i ō rātou mahi. Ka mutu, ki te taunaki ngā rōpū whakahaere pūtaiao i ngā kaupūtaiao, kāore e kore, ka nui ake ngā hua, ngā whakamahinga o te mātauranga Māori mo ngā mahi rangahau pūtaiao. Me tuwhera ngā ringa o te hunga pūtaiao ki ngā whānau ki ngā hapū me ngā iwi Māori mo ngā mahi whakarauora taiao. Mā te mahi ngātahi, mā te tōtō mai i ngā akoranga rerekē, ka hua mai ngā rongoā hei whakarauora i te taiao me te orangatonutanga o te tangata, ki Aotearoa, ōtirā, ki te ao whānui.

**Keywords:** Biodiversity loss, community partnerships, indigenous knowledge, indigenous peoples, IPBES, traditional ecological knowledge

## Introduction

Worldwide, growing recognition of the mutual benefits of collaborative partnerships between indigenous peoples, governments and conservation practitioners acknowledges the deep spiritual and cultural ties of indigenous peoples to their land, and the value of indigenous knowledge for ecology and conservation (IUCN 2016; IPBES 2019). Indigenous peoples manage or have tenure rights over more than a quarter of the earth surface, including about 40% of all terrestrial protected areas (Sobrevila 2008; Garnett et al. 2018). Most areas managed by indigenous peoples have low-intensity land uses and include many of the world's most remote and sparsely populated places; increasingly, indigenous peoples are co-managing conservation priority areas and contributing specific insights that aid protection of threatened and at-risk species and ecosystems (see Ban et al. 2008; Garnett et al. 2018; Lyver et al. 2019). The contribution of indigenous peoples and knowledge is widely acknowledged as critical to successful efforts to mitigate the impacts of climate change, habitat fragmentation and introduced species (Bond et al. 2019; IPBES 2019).

The inextricable and interdependent relationship between people and nature forms the foundation for the organisation of indigenous knowledge (Durie 2004; Berkes 2018). This embedded-in-nature relationship has led to a body of dynamic intergenerational knowledge and practice that operates within indigenous worldviews and belief systems (Berkes 2018), called *mātauranga* in Aotearoa New Zealand. The term *mātauranga* may, therefore, be used to refer to all knowledge created by Māori according to their experiences, worldview and lifeways (see Royal 2009 for further discussion). This body of knowledge, and the relationships between people and their environment, may be embedded in traditional expressions of oral tradition such as *whakapapa* (genealogical connections), *mōteatea* (formal songs) and *whakataukī* (proverbial sayings) (Mead & Grove 2004; Wehi et al. 2013). As one example, the beautiful *pātere* (chant) *Te Koko ki Ōhiwa* chronicles the connections between the natural environment and historical narratives, the customary and intellectual properties of Ōhiwa Harbour, and the *iwi* associated with it (Black 2014). As this *pātere* demonstrates, *mātauranga* comprises all aspects of Māori knowledge and practice and spans the past, present and the future (Mead 2003).

Although scholars speak and write of *mātauranga* as a coherent national knowledge system, over the last four decades it has become clear that it is more appropriate to consider *mātauranga-ā-iwi*, or local knowledge that is connected to specific *iwi* or *mana whenua*; that is, to people who have resided intergenerationally on a localised landscape (Black 2014; Doherty 2014). Doherty (2014) argues that the environment itself shapes and influences the language, and it is in the environment that knowledge is witnessed, experienced, explained, and conceptualised. *Mātauranga-ā-iwi* must therefore have a specified land base, but *mātauranga-ā-iwi* is also realised through language, and in particular the dialect of the people. Language embodies and explains the intimate connections between people and their environment and is the context for explaining broader models and constructs (Doherty 2014).

*Mātauranga* has been described as an indigenous knowledge system that spans the physical and spiritual worlds, developed through lived experiences, empirical research, and cause and effect experiments (Carter et al. 2018). Other definitions focus

on *mātauranga* as a “tool for thinking, organising information, considering the ethics of knowledge, the appropriateness of it all and informing us about our world and our place in it” (Mead 2003). These definitions move beyond past interpretations of *mātauranga* as a static archive of information towards a dynamic system that includes the uptake of new scientific methodologies (Mead 2012). In its broadest definition and usage, *mātauranga* Māori has the potential to make important contributions to both blue-sky science, and ecological management. However, the relationship of *mātauranga* to the neoclassical science tradition, often referred to as ‘western science’, remains contested. Some researchers emphasise the complementarity of these traditions (e.g. Moller et al. 2009a), whereas others assert incompatibility and suggest that *mātauranga* is “outmoded” or represents beliefs and “anecdotal evidence” (Don 2010; but see Tau 2003; Dickison 2009).

Science has been defined by the British Science Council (2009) as “the pursuit and application of knowledge and understanding of the natural and social world following a systematic methodology based on evidence”. Despite some key differences in epistemologies in which the processes of knowing and working with *mātauranga* may differ (Dickison 2009; Moller et al. 2009a; Smith et al. 2016), scientific thinking and the accumulation of empirical evidence is also a feature of *mātauranga*, and the knowledge systems of many indigenous peoples (Crawford 2009; Royal 2009; Berkes 2018). *Mātauranga* spans knowledge systems as diverse as navigation (Tuapiki 2017), weather patterns (King et al. 2008), customary management (Jones et al. 2015), climatic patterns (Lyver et al. 1999) and ecological knowledge (see Wehi et al. 2013; O’Connell-Milne et al. 2015; Whaanga et al. 2018). In all such cases, *mātauranga* as a system is maintained through practice and connection. It has an important role in the lives and identity of future generations, and can also help create new scientific insights.

## *Mātauranga* Māori and New Zealand scientists: Past history

The New Zealand science research system is beginning to acknowledge the *mātauranga* that has developed and expanded in Aotearoa New Zealand since first human settlement around AD 1300, growing from Pacific knowledge over millennia. In the 1990s, Crown Research Institutes (CRIs) and some universities, and in particular Manaaki Whenua - Landcare Research (MWLR) and the University of Otago, were at the forefront of acknowledging the Treaty of Waitangi and including Māori perspectives in the science system, with a multipronged approach that valued *mātauranga*, developed long-term community partnerships, and employed Māori researchers. MWLR recognised Treaty obligations to Māori and made institutional commitment to Māori through, for example, (1) creation of Māori positions at senior management level and on the Board, (2) holding Treaty of Waitangi workshops for all staff, and (3) actively seeking and mentoring new Māori staff. This strategy has had an enduring and important legacy. For example, long-standing partnerships were created between MWLR scientists and communities on a range of topics from toxins (Ogilvie et al. 2006a, b; Allen et al. 2014; Blackie et al. 2014) to weaving plants (e.g. Harris & Woodcock-Sharp 2000; McBreen et al. 2003; Harris et al. 2005, 2007). In some universities, seminal work was also underway, with the development of the 14-year *Kia Mau Te Titi Mo Ake Tonu*

Atu programme at the University of Otago, led by Henrik Moller, that embraced both mātauranga and population ecology approaches to questions of tūi decline (Charleton et al. 2009; Moller et al. 2009b; Clucas et al. 2012). Partnerships such as these have, nevertheless, been driven primarily by the efforts of individual researchers and their teams rather than representing a concerted universal effort across universities and CRIs.

In the early 2000s, the patchy mātauranga research landscape in the sciences began to change, driven by the science-funders, who were considering anew how best to acknowledge the Treaty of Waitangi in science and address cultural inequities. In 2005, the Ministry of Business, Innovation and Employment (MBIE) in New Zealand committed to mātauranga through the creation of the Vision Mātauranga policy and establishment of the Vision Mātauranga Capability Fund (MRST 2010), although notably this funding requires either cash or in-kind contributions from Māori to demonstrate commitment to the research, in contrast to other MBIE research funds. The new policy framework aimed to “unlock the innovation potential of Māori knowledge, resources and people to assist New Zealanders to create a better future”, recognise Māori as key partners in science and innovation, build Māori scientific capabilities and enhance the relationship between Māori and the Crown. This demand for engagement with Māori capability and mātauranga across the research system has resulted in the incorporation of Vision Mātauranga into many research programs, such as those funded through the National Science Challenges (e.g. [www.biologicalheritage.nz/about/vision-matauranga](http://www.biologicalheritage.nz/about/vision-matauranga)). Within the BioHeritage Challenge, for example, researchers have co-created a substantive and impactful research programme to conserve kēkēwai (freshwater crayfish, *Paraneohapsis zealandicus*) and kōwaro (Canterbury mudfish, *Neochanna burrowsius*) in partnership with mana whenua (Collier-Robinson et al. 2019). Similarly, in the Sustainable Seas National Science Challenge, the project “Hui-te-ana-nui: understanding kaitiakitanga in our marine environment” is driven by mātauranga Māori (see [www.sustainableseaschallenge.co.nz/programmes/tangaroa/understanding-kaitiakitanga](http://www.sustainableseaschallenge.co.nz/programmes/tangaroa/understanding-kaitiakitanga)). The Vision Mātauranga requirements have also facilitated a shift towards focusing on questions that Māori communities want to ask, and consideration of intellectual property issues and outcomes that show clear benefits for iwi.

Capacity building of Māori neo-classically trained (‘western-trained’) scientists is also a focus of many of these programmes. The number of Māori in science careers has risen, albeit slowly, from 0.7% in 1996 to 1.7% in 2008 (Sommer 2010) but the percentage of Māori academics in universities remains extremely low at approximately 5% (McAllister et al. 2019). An emerging concern is that career penalties and impediments may exist for those who do engage with mātauranga Māori (Roa et al. 2009; Smith et al. 2016). The time and energy requirements for researchers to work successfully in this space are high. Research that meaningfully engages with Vision Mātauranga requires the ability to create and maintain meaningful relationships with communities over long periods of time (both until and often beyond the fruition of projects), drawing from a skill base of ethical, bicultural practice and theory, cultural sophistication, science communication and willingness to contribute to non-academic outputs and community priorities. Such requirements go far beyond traditional expectations of academics, and are poorly acknowledged in measures of success in the academy (Asmar

et al. 2009; Roa et al. 2009). There is thus a pressing need for systems that measure research excellence to incorporate holistic assessment of both excellence and impact criteria, as emphasised by Professor Wendy Larnier in her 2019 Presidential Address to the Royal Society of New Zealand. She noted that “in an era of engagement, impact & advancement we will need to think very differently about research excellence” (<https://www.royalsociety.org.nz/major-issues-and-projects/presidents-address-2019>).

Despite these barriers, both Māori and non-Māori researchers continue to spark new research initiatives that support mātauranga Māori. The interest in producing resources accessible to Māori language users has grown, and international journals such as the Journal of Ecology, American Naturalist, and People and Nature have encouraged abstracts in indigenous languages, recognising the links between biological diversity and cultural health (Perrott et al. 2018). Abstracts have now been published in te reo Māori in international journals (Cubino et al. 2018; Bond et al. 2019; Brock et al. 2019) and in illustrative materials associated with scientific papers (e.g. <https://www.pinterest.nz/pin/503488433340748771/?autologin=true&nic=1a>). The New Zealand Ecological Society published its first bilingual (English and te reo Māori) abstract in the Annual Conference Proceedings in 2014 (see <http://www.nzes2014.org/images/custom/handbooknzes2014coversmall.pdf>), followed by bilingual abstracts in the New Zealand Journal of Ecology in 2018 and 2019 (Buxton et al. 2018; Wehi et al. 2019). Other scientists and communicators are also actively addressing the need for Māori language resources for school students (e.g. resources on fungi-<https://www.sciencelearn.org.nz/resources/2663-tenei-mea-te-hekaheka>, moths <https://www.sciencelearn.org.nz/resources/2618-ahipepe-mothnet-an-introduction>, and Māori bird names <https://www.landcareresearch.co.nz/science/plants-animals-fungi/animals/birds/biodiversity-measures/in-pictures/the-story-of-tui-te-reo>).

## Mātauranga Māori and the New Zealand Journal of Ecology

New Zealand society, and science, has changed since the establishment of the New Zealand Ecological Society in 1952. A recent analysis of the New Zealand Ecological Society highlighted that New Zealand ecologists have rarely focused on the ecological science embedded in mātauranga (Wehi et al. 2019). Exploration of the 70-year dataset showed that, to date, diversity of the society membership is likely low, although unquantified because of the limitations of available records. In its early days, the society’s membership reflected the rather monocultural composition of New Zealand university graduates; contemporary data indicate that many inequalities still limit access to science in New Zealand (McAllister et al. 2019; Naepi 2019; Wehi et al. 2019).

Because of the recent shifts toward inclusive and collaborative research in New Zealand science, we decided to identify and highlight papers previously published in the New Zealand Journal of Ecology that feature research partnerships with Māori and/ or acknowledge and explore mātauranga Māori, and to collate these in one virtual issue of the New Zealand Journal of Ecology. Our initial expectation had been that research published in the New Zealand Journal of Ecology would evolve with societal and environmental concerns and challenges over the years, and thus include

work demonstrating increased engagement with mātauranga and Māori communities. Surprisingly, we found that this was not the case. Only three articles substantively engaged with mātauranga and / or Māori communities; these are collated in this virtual issue.

We began the search process with a search of articles published in the Proceedings of the New Zealand Ecological Society and the New Zealand Journal of Ecology from 1953 to 2018 (see Wehi et al. 2019 for further discussion), using the terms “Maori” and “matauranga”. We identified 111 articles out of 1448 published papers that included one or both of these terms. Upon first glance, it appeared positive that 13% of papers published in the New Zealand Journal of Ecology mentioned “Maori” or “matauranga”. However, in 94 of these 111 articles (85%) the word “Maori” occurred without meaningful engagement with Māori language or culture or mention of mātauranga. As one example, several papers focus on a species of tree wētā, *Hemidena māori*; as such, they highlight the inappropriate naming practices sometimes used by taxonomists, where indigenous meanings may be invisible, or worse, disregarded or devalued in taxonomy (Whaanga et al. 2013). Other papers mention Māori occupation or settlement, habitat destruction, or briefly describe how a particular species (such as tī kouka or kākāpō) was important for Māori. In this editorial, we highlight what we consider to be three exemplary papers, published in the New Zealand Journal of Ecology over the 70-year period, that engage with mātauranga and Māori in meaningful ways.

In 1995, the New Zealand Conservation Authority asked for submissions on their discussion paper on Māori customary use. Wright et al. (1995) provided a perspective on customary harvesting of birds from Māori scientists. The views of the authors notably differed from the New Zealand Ecological Society’s official submission on Māori customary use of resources (New Zealand Ecological Society 1995) that cautioned against proposals to harvest and sought constraints on the partnership between Māori and the Crown. In contrast, Wright et al. (1995) highlighted the dichotomy between the ‘western’ conservation ethic and kaitiakitanga, and challenged the Crown to honour the Treaty of Waitangi and co-develop and co-manage conservation in New Zealand with Māori. They argued that the dominant conservation ethic actively excludes and alienates Māori from what was promised in Article 2 of Te Tiriti o Waitangi. The authors were at the forefront of a new wave of scholarship that critiques the preservationist nature of this conservation ethic and provides examples of cultural bias in the delegation of guardianship. Unfortunately, the issue of cultural bias remains unresolved more than 20 years later (e.g. Wehi and Lord 2017). Customary management is one of the critical pathways that connect Māori to nature, and hence support mātauranga.

Lyver (2000) and Lyver et al. (2008) focus on customary management of two culturally important bird species: tītī (*Puffinus griseus*) and kererū (*Hemiphaga novaeelandiae novaeelandiae*). Lyver (2000) is one of many papers produced from the research partnership with Rakiura Māori investigating the sustainability of Māori customary harvest of tītī. This programme remains one of the few that provide an excellent demonstration of potential pathways for healthy partnerships between Māori communities and scientists. For example, the partnership instigated a cultural safety contract developed for both researchers and community ([www.otago.ac.nz/titi/bicultural.html](http://www.otago.ac.nz/titi/bicultural.html)), supported by mātauranga Māori, as well as ‘western scientific’ approaches (e.g. Moller et al.

2009b). Collaborative papers (see, for example, Clucas et al. 2012) and books were produced (e.g. McClelland et al. 2011), presentations were given at community events, communications such as newsletters about the project were developed for the community (such as the Tītī Times), and capacity building of both Ngāi Tahu and other Māori students in science was undertaken (e.g. Charleton et al. 2009).

The work of Lyver et al. (2008) originates from a now long-term research partnership with Tuawhenua in Te Urewera that is supported by MWLR. This relationship signals a strong partnership between institutional scientists and community, by co-producing presentations and papers, supporting local people in employment, mapping community aims and aspirations into the research, and capacity building of neo-classically trained Māori scientists. It also demonstrates the ecological gains that can be achieved when mātauranga Māori is heard, and that respectful long-term relationships can be immensely beneficial to our understanding of ecological systems and biocultural relationships.

## Publication impacts

It is not always easy or clear how to determine research impact in academia. All three papers have been well cited by the scientific community according to Google Scholar (Wright et al. 1995: 29 citations; Lyver 2000: 28 citations; Lyver et al. 2008: 22 citations) as at August 2019. Wright et al. (2005) has been used in the international and national conservation literature as an example of indigenous communities challenging the preservationist conservation ethic (e.g. Brosius & Hitchner 2010). It has also been cited to provide support for a more meaningful role for Māori in management of traditionally harvested birds (Gibbs 2003; Lyver et al. 2019). On the other hand, most citations for Lyver (2000) come from other researchers associated with the tītī mātauranga project, attesting to the success of the project, but also raising questions as to whether the lessons learned have been noted internationally and in other New Zealand research projects. Most citations for Lyver et al. (2008) come from New Zealand based researchers, who refer to aspects such as the spiritual importance of harvesting, environmental management, conservation, and the importance on maintaining identity and traditional knowledge.

In the scientific community, a further interesting development since this early work has been the increasing inclusion of Māori community co-authors on publications. This trend emerged in the early work of Harris and others (Harris et al. 2005, 2007), and recurs in Lyver’s research (Lyver et al. 2008; 2017; 2019). Co-authorship acknowledges the contribution of community members to project success and indicates the value of mātauranga to the research. Certainly, inclusion of community co-authors is one indicator of an equal and productive partnership.

However, for the authors of these publications important impacts lie outside the realm of academia, as scientists seek to do better by their communities while simultaneously juggling the requirement for scientific excellence. Impact for Māori communities is a critical focus. For example, although the impact of Wright et al. (2005) to the Conservation Authority is difficult to define, the submission likely contributed toward the policy shift in favour of harvesting by Māori that now occurs in some circumstances. Similarly, work on traditional ecological knowledge systems and customary harvesting has now led to the lifting of a 50-year harvesting rāhui and the re-establishment of a customary harvest for kuia (grey-faced petrel, *Pterodroma*

*gouldii*) on Moutohora (Whale Island) by Ngāti Awa (Jones et al. 2015). Health and harvesting of kererū remain topics of paramount interest in Te Urewera, and will no doubt remain an important focus for generations to come because of the traditional importance of kererū for Tūhoe people. Tūhoe and the Department of Conservation now co-manage more than 200 000 ha of rainforest in Te Urewera, suggesting that research acknowledging the value of mātauranga as well as neoclassical science will resonate with Tūhoe communities.

## Hotspots for engagement with mātauranga Māori

Researchers who engage with mātauranga Māori have occupied a rather isolated, although vibrant, space in New Zealand ecology. Their commitment to partnership is immense, and professional rewards may be few. So why do researchers engage, and what brings researchers to this space? We argue that institutional support and personal passion are key drivers and motivators. Much of the ecological work that incorporates or acknowledges mātauranga Māori to date comes from researchers who have at some stage of their careers been based at, or are associated with, Manaaki Whenua - Landcare Research, where institutional values around mātauranga Māori are important. In short, nurturing and collaborative support of scientific researchers in an inclusive space has been and continues to be critical to the development of this field of ecology.

Notably, many of the authors of the articles included in this virtual issue are Māori. This suggests that community partnerships with non-Māori scientists are still in their infancy, and non-Māori scientists need more guidance and training from their institutions to better understand Māori worldviews and meaningfully connect with Māori communities. On the other hand, the inclusion of mātauranga in ecological research may also allow Māori researchers to connect with the science system in new, meaningful ways.

The lack of published New Zealand Journal of Ecology papers relevant to Māori aspirations and values is consistent with New Zealand Association of Scientists survey results that indicate very slow progress in scientific understanding of the value that mātauranga brings (Sommer 2010). In 1996 just 23.7% of scientists agreed with the survey statement that “In my view Māori claims to scientific knowledge derived by mātauranga Māori (traditional knowledge) deserve serious attention and public funding”. Although respondents who agreed with the statement increased to 34.7% in 2008, a large group of scientists (34.9%) remained unconvinced of the value of mātauranga Māori (Sommer 2010). This lack is also consistent with the low number of Māori scientists in New Zealand ecological research. To date, the exact numbers of Māori in the science workforce in universities and other research institutes are unknown.

## Mātauranga Māori in ecological literature

Despite the lack of papers published in the New Zealand Journal of Ecology exploring mātauranga, work has been published elsewhere in both New Zealand and international journals (e.g. Moller et al. 2004; Wehi 2009; O’Connell-Milne & Hepburn 2015; Harmsworth et al. 2016; Timoti et al. 2017). In addition, there has been a recent burgeoning of special issues that explicitly focus on mātauranga. The first of these

special issues, ‘Matauranga Maori, science and seabirds’ was published by the New Zealand Journal of Zoology in 2009, reporting the findings of 10 studies most of which were related to the research project Kia Mau Te Titi Mo Ake Tonu Atu. The Journal of the Royal Society of New Zealand supported a special issue on cross-cultural environmental research and management in 2009. In 2018, ‘Mātauranga Māori: shaping marine and freshwater futures’ was published by the New Zealand Journal of Marine and Freshwater Research, and this will be followed by special issues from the New Zealand Journal of Ecology in 2019, and the New Zealand Science Review in 2020. The 2009 and 2018 special issues have led to a marked increase in papers which incorporate mātauranga (Figure 1). However, although special issues incorporating both mātauranga and science are an excellent way to highlight distinct indigenous knowledge, it would be a forward step for these kinds of mātauranga research papers to appear regularly in journal issues.

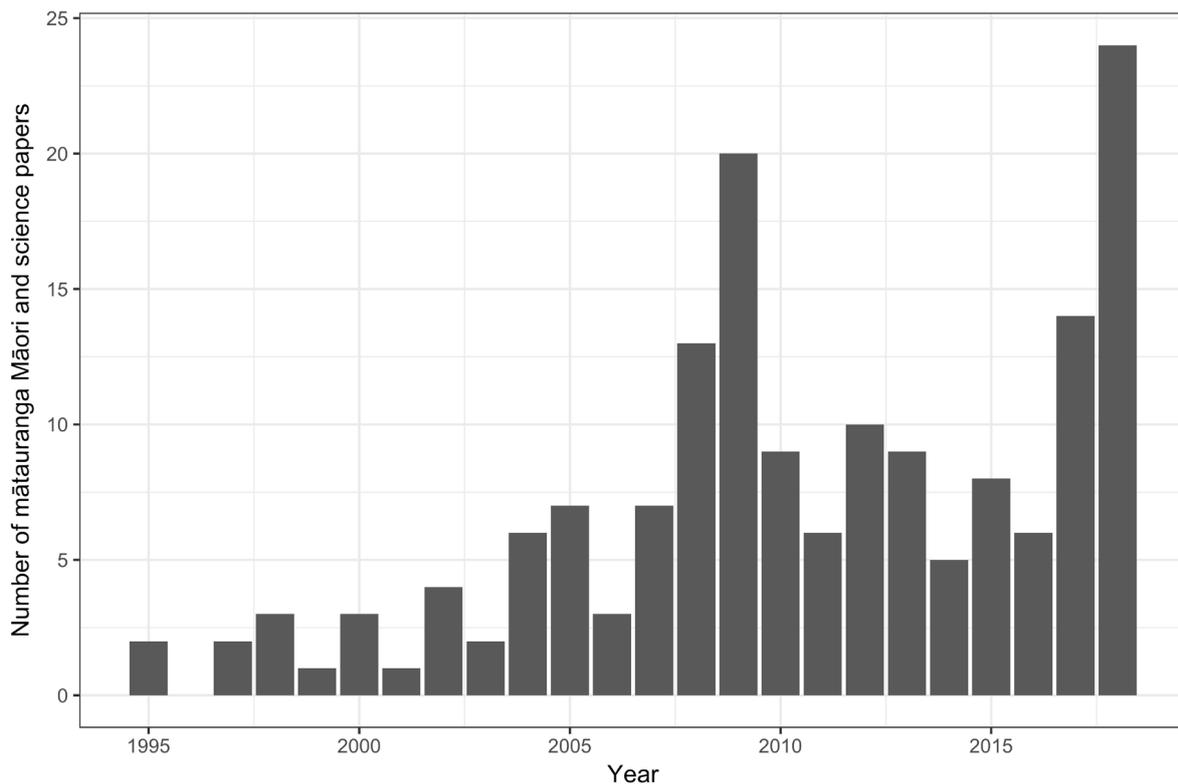
Many excellent examples of strong community partnerships that highlight mātauranga exist in the wider reviewed literature. These include unpublished reports and theses (e.g. Meurk et al. 2006; Pauling et al. 2009; Harmsworth 2002). For example, Robb (2014) worked alongside mana whenua to use both the wetland cultural health index and scientific methodologies in an investigation of wetland health and function. Many emerging mātauranga researchers appear to prioritise community responsibilities and engagement over academic demands such as publishing papers, and this is reflected in their subsequent career choices. Although some of these outputs and reports will not have been peer-reviewed, they remain valuable exemplars of innovative science that integrate mātauranga.

## Ka haere tātou ki hea? Where to now?

In New Zealand, we have the opportunity to draw from two broad knowledge streams and worldviews (mātauranga and neoclassical science) to address critical ecological issues such as habitat fragmentation and loss, climate change, and introduced species impacts. Royal (2009) has argued for the “creative potential” of mātauranga, and policy change in science funding to support mātauranga and partnership of science with Māori communities over the last 15 years has led to numerous documented examples of the valuable insights that mātauranga can bring to this body of work. Although our search of the New Zealand Journal of Ecology for published papers that engage with mātauranga and Māori communities revealed a woefully small number, we applaud the new initiatives arising in this space that herald a new era. We commend the New Zealand Ecological Society in its efforts to understand and acknowledge the value of mātauranga in ecology, and to support researchers who engage in genuine partnership with Māori communities and different knowledge systems. In the current biodiversity crisis, indigenous knowledges and peoples have a central role to play in the protection of the environment. Working with interdisciplinary knowledges, including mātauranga, will be a critical step to halt further biodiversity loss. Mātauranga Māori has much to offer all those working to achieve this aim.

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**Figure 1.** Number of published papers that incorporate both science and mātauranga Māori from 1995 to 2018. Papers found included the terms “matauranga” and “science” or “traditional ecological knowledge” and “New Zealand” in a google scholar search.

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