



Mātauranga Māori: shaping marine and freshwater futures

Joanne Clapcott (Ngāti Porou), Jamie Ataria (Rongomaiwahine, Ngāti Kahungunu, Ngati Raukawa), Chris Hepburn, Dan Hikuroa (Ngāti Maniapoto, Tainui, Te Arawa), Anne-Marie Jackson (Ngāti Whātua, Ngāti Kahu o Whangaroa, Ngāpuhi, Ngāti Wai), Rauru Kirikiri (Te Whānau a Āpanui) & Erica Williams (Ngāti Whakaue, Ngāti Pikiao, Te Whanau a Maruhaeremuri)

To cite this article: Joanne Clapcott (Ngāti Porou), Jamie Ataria (Rongomaiwahine, Ngāti Kahungunu, Ngati Raukawa), Chris Hepburn, Dan Hikuroa (Ngāti Maniapoto, Tainui, Te Arawa), Anne-Marie Jackson (Ngāti Whātua, Ngāti Kahu o Whangaroa, Ngāpuhi, Ngāti Wai), Rauru Kirikiri (Te Whānau a Āpanui) & Erica Williams (Ngāti Whakaue, Ngāti Pikiao, Te Whanau a Maruhaeremuri) (2018) Mātauranga Māori: shaping marine and freshwater futures, New Zealand Journal of Marine and Freshwater Research, 52:4, 457-466, DOI: [10.1080/00288330.2018.1539404](https://doi.org/10.1080/00288330.2018.1539404)

To link to this article: <https://doi.org/10.1080/00288330.2018.1539404>



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INTRODUCTION



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Joanne Clapcott (Ngāti Porou) ^a, Jamie Ataria (Rongomaiwahine, Ngāti Kahungunu, Ngāti Raukawa)^a, Chris Hepburn^b, Dan Hikuroa (Ngāti Maniapoto, Tainui, Te Arawa) ^c, Anne-Marie Jackson (Ngāti Whātua, Ngāti Kahu o Whangaroa, Ngāpuhi, Ngāti Wai)^d, Rauru Kirikiri (Te Whānau a Āpanui)^e and Erica Williams (Ngāti Whakaue, Ngāti Pikiao, Te Whanau a Maruhaeremuri)^f

^aCawthron Institute, Nelson, New Zealand; ^bDepartment of Marine Science, University of Otago, Dunedin, New Zealand; ^cMāori Studies, University of Auckland, Auckland, New Zealand; ^dTe Koronga, University of Otago, Dunedin, New Zealand; ^eRK Associates Limited, Wellington, New Zealand; ^fNational Institute of Water and Atmospheric Research Ltd, Wellington, New Zealand

ARTICLE HISTORY Received 19 October 2018; Accepted 19 October 2018

Introduction

Mātauranga Māori is a continuum of distinct knowledge with Polynesian origins that grew in Aotearoa New Zealand,¹ including Māori worldview, values, culture and cultural practice, and perspectives that establish Māori identity, responsibilities, and rights to manage and use resources (Mead 2012; Mercier et al. 2011; Mikaere 2011; Royal 2012). As such, mātauranga Māori is considered the *ūkaipō* (source) of knowledge in Aotearoa New Zealand (Hikuroa 2017). *Mōhiotanga* (understanding), Indigenous Knowledge (IK) or Traditional Ecological Knowledge (TEK) are all part of mātauranga Māori, but defining it as knowledge alone is inadequate. Mātauranga Māori is understood within Te Ao Māori, a Māori worldview, that has at its foundation relationships between everything seen and unseen, humans and more-than humans, the natural and spiritual world, and in turn shapes the Māori way of doing things.

There is an enormous potential for the use of mātauranga Māori to more widely enhance the understanding of aquatic ecosystems, underpin culturally-appropriate restoration approaches, and provide a more holistic and integrated perspective for activity in this realm, including research, monitoring, planning, and policy and resource development. This special issue brings together rich and diverse experiences and opinions on how mātauranga Māori is informing current, and can inform future, research and decision-making in aquatic environments of Aotearoa New Zealand. In this paper, we further describe the unique process of creating this special issue and discuss the guiding principles and emerging ideas from mātauranga Māori in relation to marine and freshwater *kaitiakitanga* (guardianship).

Historical and contemporary setting

In this special issue, the historical and contemporary setting which has hindered and aided Māori participation in aquatic management is discussed (Ataria et al. 2018; Hepi et al.

2018). Historically, colonisation has impacted on mātauranga Māori via the detrimental effect of disconnecting people and place (Ataria et al. 2018; Hepi et al. 2018). Indigenous knowledge has been devalued, marginalised and/or misappropriated in Aotearoa and internationally (Hikuroa 2017; Jackson 1992; Stevenson 2004). Māori have been forced to work within the constraints of a western science system and subject to unequal power relations (Mercier et al. 2011). In the past, this has minimised the ability of Māori to fulfil their *kaitiakitanga* obligations in marine and freshwaters in many parts of Aotearoa.

A number of key policy drivers over the past 20 years have influenced Māori participation in freshwater and marine research, planning, policy and management. These include Treaty of Waitangi claims and settlements including WAI 262, Conservation Act 1987, Resource Management Act 1991 (RMA) and the related National Policy Statement for Freshwater Management 2014 (NPS-FM), Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010, Marine and Coastal Area (Takutai Moana) Act 2011 and most recently the Te Awa Tupua (Whanganui River Claims Settlement) Act 2017. For example, Treaty settlements have provided the avenue to reinstate the governance of natural resources by Māori that were always intended by their signing of the Treaty of Waitangi. The RMA and the NPS-FM directs all decision makers to recognise the Māori relationship with water and have particular regard to *kaitiakitanga* (Ruru 2018). While this special issue does not provide an indepth review of how policy has influenced Māori participation in aquatic management, Ataria et al. (2018) note that the WAI 262 Inquiry has identified that 'New Zealand's law and policy has to catch up' to 'balance' *kaitiaki* relationships with the interests of the wider community. The Te Awa Tupua Act, which recognises the Whanganui River as its own legal entity, is perhaps movement in the right direction for the transformation of Aotearoa New Zealand's environment laws (Ruru 2018).

The Vision Mātauranga (VM) science policy framework introduced in 2005 recognised the validity of Māori knowledge and communities as a source of innovation that could contribute to national economic, social and environmental goals (MoRST 2007). In the early years of VM implementation, outcomes were arguably contrary to the original intent and marginalised VM to a 'cultural objective' rather than enabling Māori research of relevance to Māori (Ataria et al. 2018). More recently, VM has evolved to include more meaningful assessment criteria for government-funded research, ensuring distinct traditional and contemporary knowledge is valued and used in Māori communities according to their needs, aspirations and circumstances. Much of the research in this special issue has been assisted in part by the VM policy shaping the allocation of government research funding (e.g. Hepi et al. 2018; Kainamu-Murchie et al. 2018; Kitson et al. 2018; Kusabs et al. 2018; Ogilvie et al. 2018; Whaanga et al. 2018). However, despite the majority of national science programmes now containing research driven by VM policy and over 140 VM Capability Fund projects being granted between 2013 and 2018 (<https://www.mbie.govt.nz/>; accessed 28 September 2018), capacity and capability deficits still remain a big challenge to realising the potential of VM policy (Ataria et al. 2018).

In this special issue, we contend that mātauranga Māori is a method for generating knowledge, and all of the knowledge generated using that method, it is both traditional and contemporary. *Ka mua, ka muri*—we look to the past as we move forward into the future. The content of *whakataukī* (proverbs) have been examined in this special issue to illustrate the rich oral history regarding marine and freshwater resources in particular

(Wahaanga et al. 2018). Wahaanga et al. (2018) illustrate the importance of *whakataukī* to recall or recount historical events, e.g. *Ka rangaranga te muri, ka tū ngā tuātara o tāmure* ‘When the breeze blows gently will the spines of the snapper stand up’ (Mead and Grove 2001) refers to a reply from Tūtāmure, a great warrior leader, to Kahungunu’s call of who was attacking his pā. *Whakataukī* which reference *ika* (fish) provide information on leadership, chieftainship, warfare and societal guidelines, e.g. *Kei au te mātāika!* ‘I have the honour of the first slain’ (Mead and Grove 2001), where *ika* is used as an idiom for an enemy. Further, the use of specific species in *whakataukī* often align to human traits and values, e.g. *kākahi* (freshwater mussel), *kōura* (crayfish) and *tuna* (eels) are prized species and may represent chieftains, child-bearing/nurturing, cleansing, or watchfulness. Interestingly, Wahaanga et al. (2018) showed that marine terminology is far more dominant than freshwater references in *whakataukī*, illustrating the close proximity and relationship of Māori with the marine environment. However, there was an increase in the inclusion of freshwater related terminology in *whakataukī* in the period AD 1500–1650, when it is estimated Māori arrived in Aotearoa (Wahaanga et al. 2018).

Fostering kaitiakitanga

Kaitiakitanga is the responsibility of all and strives to regulate and sustain the well-being of people and natural resources underpinned by values such as *whakapapa* (connection, lineage, or genealogy between people and ecosystems and all flora and fauna), *mana* (prestige, authority), and *mauri* (life essence), and using tools and methods such as *rāhui* (temporary prohibition, reserve). This special issue provides several examples of approaches to *kaitiakitanga* resulting in mutual benefit for people and the environment. At the heart of many successful approaches are enduring partnerships and mātauranga-informed management.

For example, Hepi et al. (2018) explored how the Integrated Kaipara Harbour Management Group (IKHMG) overcame issues associated with ‘integrating’ indigenous knowledge into management of the Kaipara Harbour and its catchment, by integrating knowledge holders into planning and decision-making processes. The IKHMG is a contemporary example of *kaitiakitanga* enabled by Treaty of Waitangi settlement; its success lies in ‘recognising the validity of both knowledge systems ... and accepting that each needs to be given its own space’ (Durie 2004 in Hepi et al. 2018). In this way, a mātauranga-informed management plan could be adopted, which enables local Māori to articulate management in their own terms. Hepi et al. (2018) argue that creating and protecting a space for indigenous thought provides a catalyst for collective action.

In a similar vein but at the other end of the country, Kitson et al. (2018) discuss the Murihiku Cultural Water Classification System which was founded on partnerships between people, disciplines and knowledge systems (e.g. mātauranga Māori, social science, science and cultural heritage). The aim of the study was to articulate the holistic health of Murihiku cultural values and uses to assist *mana whenua* (people with authority over tribal land) in the diverse array of freshwater management forums and decision-making they are involved in—and to do so in a robust, respectful and meaningful way that strengthens cross-cultural understandings of the water-related dependencies of Murihiku cultural values and uses. Mātauranga originates, and is specific to, geographic place and local context—‘The whakapapa of knowledge is important’ (Kitson et al. 2018). As such, Kitson et al. (2018) argue there is a need to protect indigenous intellectual property

/ mātauranga Māori by a) seeking appropriate permissions to use information and accepting that sharing does not infer an ongoing use right, b) acknowledging historical sources and biases, and c) exploring how heritage mechanisms can support *kaitiakitanga* and *tino rangatiratanga* (self-determination) of mātauranga.

Ki uta ki tai (from mountain to the sea) is a philosophy that reflects the Ngāi Tahu view of environmental and resource management and acknowledges both the biophysical connectivity and the reciprocal relationship between people and the environment (Te Rūnanga o Ngāi Tahu 2003, in Tipa et al. 2016). Kainamu-Murchie et al. (2018) used a survey approach to identify how local estuarine users have been effected by anthropogenic impacts and exclusion from decision-making processes. They identified that the environmental indices commonly utilised by survey participants were similar to global estuarine stressors, e.g. organic waste, chemical contaminants and sediment. Further, experienced estuarine users, including *mana whenua*, were less likely to gather shellfish from unsafe areas than less experienced users. They argue that more holistic and participatory approaches, which include local ecological knowledge and mātauranga Māori, are needed to achieve the integrated '*ki uta ki tai* and beyond' approach to water management adopted by local council (Environment Canterbury 2015).

An example of the success of using local Māori knowledge systems to provide the foundations for improving, enhancing and safeguarding traditional mussel populations in Ōhiwa harbour is provided by Paul-Burke et al. (2018). A mussel management action plan (MMAP) was co-designed by local *iwi* (tribe) and government partners grounded by the principles of mātauranga Māori and *whanaungatanga* (relationships). The MMAP a) established an inclusive harbour-wide mussel monitoring regime, and b) collated information about how best to utilise mātauranga Māori and other knowledge systems to restore mussel populations. Paul-Burke et al. (2018) conclude that designing and implementing the MMAP was an expression of contemporary *kaitiakitanga*.

For the *hapū* (sub-tribe) of the Mōtū River mouth (eastern Bay of Plenty), *kahawai* (*Arripis trutta*) were identified as a cultural keystone species (Noble et al. 2016) and are the focus of sustainable fisheries development (Maxwell et al. 2018). Maxwell et al. (2018) highlight how indigenous knowledge and management systems can provide sustainable management practices by enhancing cultural values connected to fisheries. For example, the practise of *rāhui* and other *tikanga*-based harvesting, such as only catching what is needed and using the whole fish. It is suggested that the recognition of cultural keystone species is a useful tool for including cultural values in fisheries management.

Finally, Jackson et al. (2018) reflect on how for over 25 years the East Otago Taiāpure has incorporated *mātauranga-ā-hapū* (sub-tribal knowledge) to inform decision-making to advocate for better management of local fisheries. *Taiāpure* (local fishery) is part of a suite of customary fishery management tools and is grounded by the principles of *rangatiratanga* (chieftanship) and *kaitiakitanga*. Establishment of the East Otago Taiāpure provided the opportunity for local *iwi/hapū* to regain control and halt the decline of fisheries resources and fulfil their roles as *kaitiaki* for the benefit of future generations. It has also provided the vehicle to recognise the cultural significance of places and *mahinga kai* (food gathering customs) and serves as a useful reference for others wishing to explore the *taiāpure* approach.

Māori innovation

In addition to examples of mātauranga-informed research and management of aquatic systems, this special issue provides examples of mātauranga-informed revitalisation of fisheries, such as scampi (Ogilvie et al. 2018) and kōura (Kusabs et al. 2018), as well as examples of the development of mātauranga-informed tools for assessing the *mauri* of *awa* (rivers) (Hikuroa et al. 2018; Hopkins 2018) and informing river flow-setting (Crow et al. 2018).

Ogilvie et al. (2018) report on how mātauranga Māori can be engaged in the Aotearoa New Zealand scampi industry as it moves through a technological transition focused less on ‘how can we catch more fish’ and more on ‘how can we reduce the impact of fishing on the environment’. Underpinned by *kaitiakitanga*, the transdisciplinary research aimed to develop new fishery technologies based on TEK (e.g. potting systems and bait types) and enable the application of the technology by grounding it in a *mātauranga* framework. The research is ongoing, but early results show promise for meeting the shared goal of a sustainable scampi fishery.

Traditional techniques for harvesting kōura (*Paranephrops planifrons*) have previously been shown to be effective across a range of environment types (Kusabs et al. 2015; Kusabs & Quinn 2009) and support the cultural values of *whakapapa* (geneology) and *kaitiakitanga* by reconnecting people with place and supporting the succession of indigenous knowledge. In this issue, Kusabs et al. (2018) further tested the efficacy of the *whakaweku* (artificial habitats made from fronds of bracken fern) to harvest kōura and bullies (*Gobio-morphus spp.*) compared to the minnow traps, fyke nets and electrofishing. They showed that *whakaweku* provided high capture rates of kōura and bullies at lower effort compared to other techniques, and they suggest that *whakaweku* are a good cost-effective tool for engaging communities in monitoring and resource management.

Another tool that has been developed to afford *iwi/hapū* greater participation and *tino rangatiratanga* in environmental monitoring and management is the Mauri Model (Morgan 2006). In this special issue, Hikuroa et al. (2018) use the tool to demonstrate how a depletion in the *mauri* of *Te Awa o te Atua* (known today as the Tarawera River) correlates to major anthropogenic impacts in the catchment. By assessing indicators of cultural, environmental, social and economic well-being, Hikuroa and colleagues demonstrated the relative effect of major disturbances in the River catchment over the last 100 years. Results showed that the re-routing of *Te Awa o te Atua* had effectively ‘severed the head of the river’ and had the most significant impact on *mauri* (Hikuroa et al. 2018). The analysis has aided local *iwi* to quantify and communicate the concept of *mauri* and strengthen their role as *kaitiaki*.

Further in this special issue, Hopkins (2018) describes an alternative approach to assessing the *mauri* of *awa* developed by Waikato-Tainui *hapū* Ngaati Hine, Ngaati Naho and Ngaati Pou. They used a combination of ‘moohiotanga tuku iho’ (a coined term that captures local oral histories, songs, prayers and carvings), contemporary *mātauranga* and western science to classify the *mauri* of Matahuru River in North Waikato. Where previously they have been prevented from undertaking their *kaitiakitanga* and *manaakitanga* responsibilities, mainly due to significant landuse changes and land alienation preventing access, the use of modern technology (e.g. Google Earth) and bird habitat modelling exercises have allowed *hapū* to reconnect to their *whenua* (land) and better understand the

beneficial and negative impacts of anthropocentric influences in the landscape (Hopkins 2018).

Finally, Crow et al. (2018) outline a tool for incorporating cultural values into decision making about river flows. A Cultural Flow Preference Study, where Māori repeatedly visit rivers during a range in river flows, and linear mixed modelling were undertaken to demonstrate how river flows contributed to overall river health as defined by local *hapū* in Canterbury. The relationship between changes in river flow and river health was shown to vary among river sites, and individual assessors were relatively consistent in their assessments within rivers. Crow et al. (2018) suggest that the approach is transferable and could be calibrated by Māori elsewhere to examine and communicate the influence of flow allocation on their cultural values.

The process of compiling this special issue

To create this special issue the editorial team inherently adopted *kaupapa* Māori principles. These principles, as related to the compilation of this special issue and the way we worked with each other and with the authorship teams, included:

- *Tino rangatiratanga*—relates to sovereignty, autonomy, control, self-determination and independence and allows Māori to control their own culture, aspirations and destiny;
- *Taonga tuku iho*—asserts the centrality and legitimacy of Te Reo Māori, tikanga and mātauranga Māori and allows the Māori ways of knowing, doing and understanding the world to be considered valid in their own right;
- *Whānau* and *whakawhanaungatanga*—regards the extended family structure and acknowledges the relationships that Māori have to one another and to the world around them;
- *Manaaki tangata* and *Tuakana-teina*—being generous and supportive;
- *Āta* and *Aroha*—nurturing relationships and working with sincerity and mutual respect; and
- *Tūpatotanga* and *Mana*—working with caution to maintain the respect of authors and their respective *kaupapa* (topic or approach)

The call for abstracts was intentionally very broad to allow a wide range of *kairangahau* (researchers) to submit their work for consideration. As marine and freshwater are important *kaupapa* for Māori, this special issue has a natural alignment with mātauranga Māori, and Māori have a number of important contributions in these spaces. Perhaps then not surprisingly, 41 abstracts were received. The editorial team met *kanohi ki te kanohi* (face to face) to assess submitted abstracts. Selection was based on diversity and representation, in terms of topic, geography, age/experience, and gender. Importantly, the contribution of *kairangahau* Māori needed to be evident in the submission in line with our guiding principle of *Tino Rangatiratanga*. Another acknowledged bias in selection was towards those Māori researchers who are new to the science publication process. As such, the editorial panel recognised the need to adopt a *Tuakana-teina* approach to provide more support to authors than might usually be afforded during normal science publication in line with the guiding principles of *Manaaki tangata*, *Whānau* and *Āta*.

The editorial board was in turn supported by the inclusion of *kaumātua* (respected elder) Rauru Kirikiri who provided *kawa whakaruruhau* (cultural safety) to the process.

According to standard journal peer review practise, initially most submitted manuscripts were sent out for blind review; however, in our special issue, the process often ended in a much more open and transparent review process where discussion of content frequently occurred between authors, reviewers and the editorial team, further illustrating the *Whanau*, *Āta*, *Aroha*, and *Tuakana-teina* principles. When it came to publication, the *Taonga Tuku Iho* guiding principle further came to light through the support of abstracts in Te Reo Māori, and the acknowledgement of the *mana* of *iwi/hapū* affiliation as part of an author's name if desired. Thus, supporting the on-going recognition of Te Reo Māori as a *taonga* (treasure) and as an official language of Aotearoa New Zealand in Royal Society journals.

There were several learnings that were gained through this process in relation to the differences in 'normal' review practices that are not necessarily *Mana* enhancing toward authors. As such, we employed the principles of *Whānau* and *Whakawhanaungatanga* to reframe the process and applied *Manaaki tangata* and *Tūpatotanga* to ensure the authors and us as an editorial team were able to work in ways that kept our authorship teams, their partnerships and our handling editors *Mana* intact. On reflection, we recognise the on-going need to build cross-cultural understandings in regards to the rights, interests, and values of Māori across institutions, agencies and researchers from a wide range of disciplines.

Final remarks on mātauranga Māori shaping marine and freshwater futures

The final manuscript in this special issue highlights the future promise for mātauranga Māori to shape marine and freshwater futures in Aotearoa. We are aware of many cases throughout the country where *kura* (schools) are embracing a *kaupapa* Māori approach to education that fosters the relationship between people and the environment. Callaghan et al. (2018) share a *rangatahi* (youth) perspective on the importance of, and benefits to be gained by, learning from a western science perspective alongside a mātauranga-informed curriculum. Their urban stream study highlights the opportunities to be gained from this holistic and bicultural approach to educating the *kaitaki* of tomorrow.

We see common threads and lessons in the knowledge shared in this special issue including recognition and respect of knowledge holders, meaningful engagement and partnerships, the fostering of relationships (between peoples and places) and succession. The validity of mātauranga Māori to contribute to aquatic management has never been questioned by Māori, but importantly, we contend that this special issue has clearly illustrated the positive gains to be achieved when mātauranga Māori and Māori principles, values and approaches are at the heart of environmental decision-making in Aotearoa.

Finally, we recognise that there are topics that are not covered in depth in this special issue but are still important for realising the potential for mātauranga Māori to enhance the understanding of aquatic ecosystems and provide a more holistic and integrated perspective for research in particular. We hope that this special issue is useful for initiating further discussions on: Māori-driven research agendas and priorities, including setting expectations related to time and defining process; intellectual property and transparency

around the benefits to Māori of publishing and sharing knowledge (including beyond the life of a particular research programme); Māori review of research data and interpretation of findings; strategies for empowering Māori narratives and collaboration with Māori communities; and strategies for approaching capacity issues and capacity development (research and implementation), both in Māori communities and among non-Māori researchers.

Note

1. Although Aotearoa is a Māori name for New Zealand's North Island, it is commonly used in this context, e.g. Aotearoa New Zealand, to mean all of New Zealand.

Acknowledgements

We thank all the authors and reviewers who contributed to producing this special issue. We thank Dave Watson and Craig Callaghan for sharing their art for the cover of this special issue, and we also thank the Royal Society NZ for their support.

Disclosure statement

No potential conflict of interest was reported by the authors.

ORCID

Joanne Clapcott  <http://orcid.org/0000-0003-2467-0490>

Dan Hikuroa  <http://orcid.org/0000-0002-7340-7106>

References

- Ataria J, Mark-Shadbolt M, Te Pareake-Mead A, Prime K, Doherty J, Waiwai J, Ashby T, Lambert S, Garner GO. 2018. Whakamanahia Te mātauranga o te Māori: empowering Māori knowledge to support Aotearoa's aquatic biological heritage. *New Zealand Journal of Marine and Freshwater Research*. 52(4):467–486.
- Callaghan P, Paraone R, Murray M, Tahau N, Edgerton S, Bates E, Ataria E, Heremaia H, Rupene N, Wilson E, et al. 2018. Tuākana/Teina Water Warriors Project: a collaborative learning model integrating mātauranga Māori and science. *New Zealand Journal of Marine and Freshwater Research*. 52(4):667–674.
- Crow SK, Tipa GT, Booker DJ, Nelson KD. 2018. Relationships between Maori values and streamflow: tools for incorporating cultural values into freshwater management decisions. *New Zealand Journal of Marine and Freshwater Research*. 52(4):626–642.
- Environment Canterbury. 2015. Canterbury land and water regional plan. Vol. 1. Christchurch: Environment Canterbury Regional Council, Kaunihera Taiao ki Waitaha. 384 p.
- Hepi M, Foote J, Makey L, Badham M, Te Huna A. 2018. Enabling mātauranga-informed management of the Kaipara Harbour, Aotearoa New Zealand. *New Zealand Journal of Marine and Freshwater Research*. 52(4):497–510.
- Hikuroa D. 2017. Mātauranga Māori—the ūkaipō of knowledge in New Zealand. *Journal of the Royal Society of New Zealand*. 47(1):5–10.
- Hikuroa D, Clark J, Olsen A, Camp E. 2018. Severed at the head: towards revitalising the mauri of Te Awa o te Atua. *New Zealand Journal of Marine and Freshwater Research*. 52(4):643–656.

- Hopkins A. 2018. Classifying the mauri of wai in the Matahuru Awa in North Waikato. *New Zealand Journal of Marine and Freshwater Research*. 52(4):657–666.
- Jackson M. 1992. The treaty and the word: the colonisation of Māori philosophy. In: Oddie G., Perrett R, editor. *Justice, Ethics and New Zealand Society*. Auckland: Oxford Unveristy Press; p. 1–10.
- Jackson A-M, Hepburn C, Flack B. 2018. East Otago Taiāpure: sharing the underlying philosophies 26 years on. *New Zealand Journal of Marine and Freshwater Research*. 52(4):577–589.
- Kainamu-Murchie AA, Marsden ID, Tau RTM, Gaw S, Pirker J. 2018. Indigenous and local peoples' values of estuarine shellfisheries: moving towards holistic-based catchment management. *New Zealand Journal of Marine and Freshwater Research*. 52(4):526–541.
- Kitson JC, Cain AM, Johnstone MNTH, Anglem R, Davis J, Grey M, Kaio A, Blair S, Whaanga D. 2018. Murihiku cultural water classification system: enduring partnerships between people, disciplines and knowledge systems. *New Zealand Journal of Marine and Freshwater Research*. 52(4):511–525.
- Kusabs IA, Hicks BJ, Quinn JM, Perry WL, Whaanga H. 2018. Evaluation of a traditional Māori harvesting method for sampling kōura (freshwater crayfish, *Paranephrops planifrons*) and toi toi (bully, *Gobiomorphus* spp.) populations in two New Zealand streams. *New Zealand Journal of Marine and Freshwater Research*. 52(4):603–625.
- Kusabs IA, Quinn JM. 2009. Use of a traditional Maori harvesting method, the tau kōura, for monitoring kōura (freshwater crayfish, *Paranephrops planifrons*) in Lake Rotoiti, North Island, New Zealand. *New Zealand Journal of Marine and Freshwater Research*. 43(3):713–722.
- Kusabs IA, Quinn JM, Hamilton DP. 2015. Effects of benthic substrate, nutrient enrichment and predatory fish on freshwater crayfish (kōura, *Paranephrops planifrons*) population characteristics in seven Te Arawa (Rotorua) lakes, North Island, New Zealand. *Marine and Freshwater Research*. 66(7):631–643.
- Maxwell KH, Ngāti Horomoana TW-a-H, Arnold R, Dunn MR. 2018. Fishing for the cultural value of kahawai (*Arripis trutta*) at the Mōtū River, New Zealand. *New Zealand Journal of Marine and Freshwater Research*. 52(4):557–576.
- Mead HM. 2012. Understanding Mātauranga Māori. In: Haemata Ltd, Black T, Bean D, Collings W, Nuku W, editor. *Conversations On Mātauranga Māori*. Wellington: New Zealand Qualifications Authority; p. 9–14.
- Mead SM, Grove N. 2001. *Ngā pēpeha a ngā tipuna: the sayings of the ancestors*. Wellington: Victoria University Press.
- Mercier RO, Stevens N, Tia A. 2011. Mātauranga Māori and the Data-Information-Knowledge-Wisdom Hierarchy: A conversation on interfacing knowledge systems. *Mai Journal*. 1:103–116.
- Mikaere A. 2011. *Colonising Myths–Māori Realities: He Rukuruku Whakaaro*. Wellington, New Zealand: Huia Publishers. 380 p.
- Morgan TKKB. 2006. Decision-support tools and the indigenous paradigm. *Proceedings of the Institution of Civil Engineers–Engineering Sustainability*. 159:169–177.
- MoRST. 2007. *Vision Mātauranga. Unlocking the innovation potential of Maori knowledge, resources and people*. Ministry of Research, Science and Technology. <https://www.mbie.govt.nz/info-services/science-innovation/agencies-policies-budget-initiatives/vm-booklet.pdf>.
- Noble M, Duncan P, Perry D, Prosper K, Rose D, Schnierer S, Tipa G, Williams E, Woods R, Pittock J. 2016. Culturally significant fisheries: keystones for management of freshwater social-ecological systems. *Ecology and Society*. 21(2):22. <https://www.ecologyandsociety.org/vol21/iss2/art22/>
- Ogilvie S, Major R, McCarthy A, Paine G, Paine R, Connor G, Connor S, Taylor D, Jeffs A, Heasman K, et al. 2018. Mātauranga Māori driving innovation in the New Zealand scampi fishery. *New Zealand Journal of Marine and Freshwater Research*. 52(4):590–602.
- Paul-Burke K, Burke J, Te Ūpokorehe Resource Management Team, Bluett C, Senior T. 2018. Using Māori knowledge to assist understandings and management of shellfish populations in Ōhiwa harbour, Aotearoa New Zealand. *New Zealand Journal of Marine and Freshwater Research*. 52(4):542–556.
- Royal TAC. 2012. Politics and knowledge: Kaupapa Māori and mātauranga Māori. *New Zealand Journal of Educational Studies*. 47(2):30–37.

- Ruru J. 2018. Listening to Papatūānuku: a call to reform water law. *Journal of the Royal Society of New Zealand*. 48(2–3):215–224.
- Stevenson MG. 2004. Decolonizing co-management in northern Canada. *Cultural Survival Quarterly*. 28(1). <https://www.culturalsurvival.org/publications/cultural-survival-quarterly/decolonizing-co-management-northern-canada>.
- Tipa G, Harmsworth G, Williams E, Kitson J. 2016. Integrating mātauranga Māori into freshwater management, planning and decision-making. In Jellyman PG, Davie TJA, Pearson CP, Harding JS, editors. *Advances in Freshwater Research*. Wellington, New Zealand: New Zealand Hydrological Society and New Zealand Freshwater Sciences Society Publication. p. 613–631.
- Whaanga H, Wehi P, Cox M, Roa T, Kusabs I. 2018. Māori oral traditions record and convey indigenous knowledge of marine and freshwater resources. *New Zealand Journal of Marine and Freshwater Research*. 52(4):467–486.