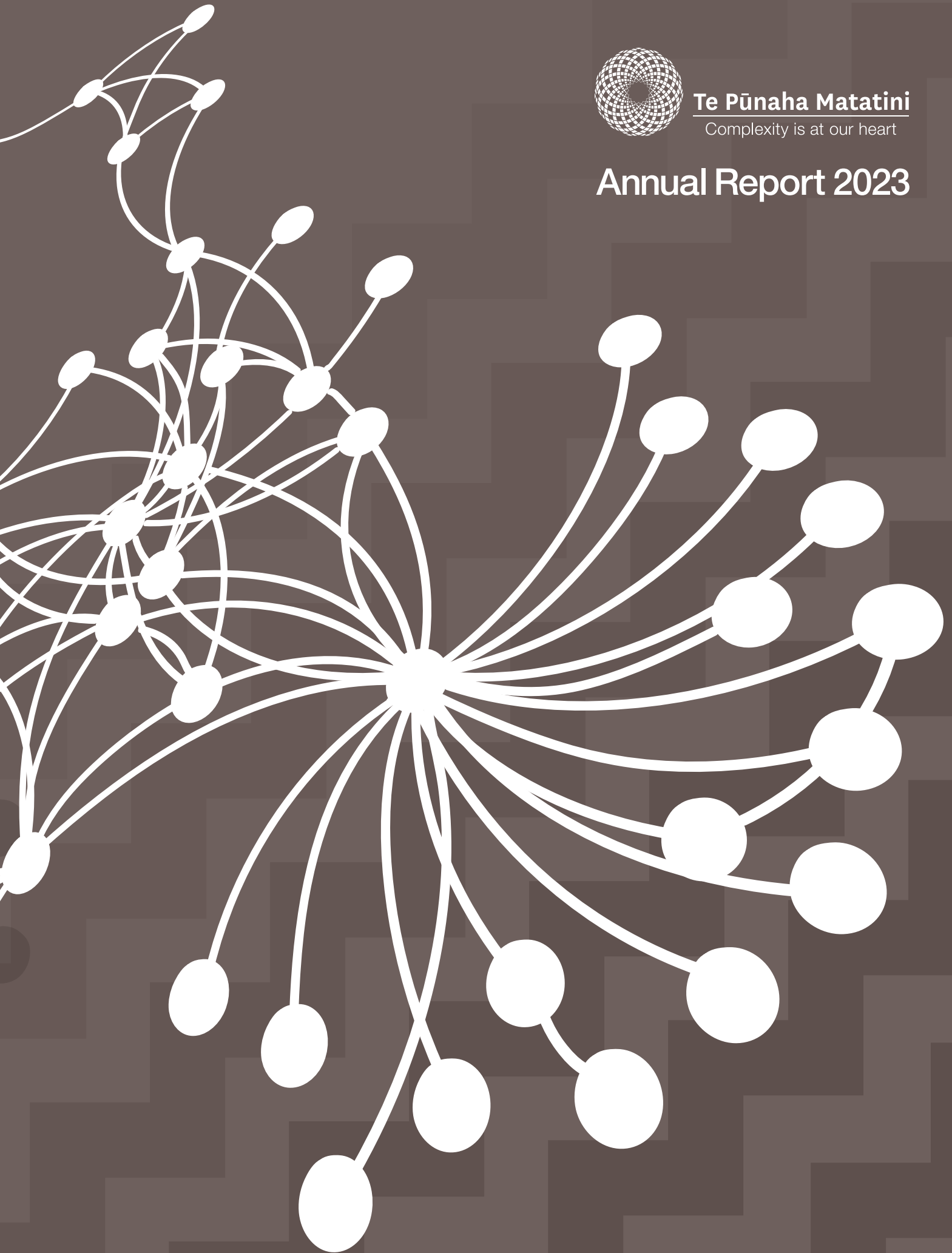


Te Pūnaha Matatini
Complexity is at our heart

Annual Report 2023



Īāhahā!

Tēnei Te Pūnaha Matatini

E haere tūpapahū nei

Ki te ōwī, ki te ōwā –

Ka haruru; ka ngatoro;

Ki runga ki ngā iwi

O te motu whānui,

O te ao nui tonu.

He kōingo ki te pono,

He minaka ki te tika,

Te whīwhiwhi nui rawa

Te tātaitanga uaua

Te Pūnaha Matatini –

Tihei mauri ora!

This is Te Pūnaha Matatini
Sounding out as we travel
Near and far –
Noisily proclaiming
Amongst the people
Throughout the land,
Indeed the world.
Our yearning for truth,
Our desire for justice,
In the many complexities
And intricacies we encounter
As Te Pūnaha Matatini

Tihei mauri ora!

A Centre of Research Excellence hosted by the University of Auckland



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About us

Complexity is at our heart

**We build community across disciplines
to solve complex problems.**

Te Pūnaha Matatini – the meeting place of many faces – is the Aotearoa New Zealand Centre of Research Excellence for complex systems. We are funded by the Tertiary Education Commission and hosted by the University of Auckland. We bring together researchers from tertiary institutions, government institutes, private sector organisations and marae communities from throughout Aotearoa New Zealand.

We apply inter- and transdisciplinary approaches to address the most complex and critical issues of our time.

Our strategy is to transform the research system in Aotearoa New Zealand by embedding a strong foundation of values that permeates the work that we do on complex systems. We train ethical, collaborative researchers that work with complex data across diverse sectors.

Te Pūnaha Matatini provides a safe place for researchers to grow and develop.

Ko te matatini-tanga hei iho

Ko tā mātou he whakatupu hāpori i ngā pekanga mātauranga hei rongoā i ngā raru matatini.

Ko Te Pūnaha Matatini, arā, ko te kāpunipunitanga o ngā tini mata – ko te whare o te rangahau kōunga o Aotearoa mō ngā pūnaha matatini. He mea tautoko mātou, ā-pūtea nei, e Te Amorangi Mātauranga Matua, he mea whakaruruhau anō hoki e Waipapa Taumata Rau. Ko tā mātou he whakakotahi mai i ngā kairangahau nō ngā whare wānanga, nō ngā tari kāwanatanga, nō ngā whaka-haere nō te rāngai tūmataiti, nō ngā hāpori nō ngā marae puta noa i Aotearoa anō hoki.

Ka whāia e mātou ngā ara mahi ngātahi, whakawhitiwhiti anō hoki i waenga i ngā pekanga mātauranga, kia aro atu ai ki ngā take matatini katoa, ki ngā take whai tikanga katoa hoki o te wā.

Ko tā mātou rautaki ko te panoni i te pūnaha rangahau i Aotearoa mā te whakaū i ētahi uaratanga pakari hei tūāpapa mō ā mātou mahi e hāngai ana ki ngā pūnaha matatini. Ka whakangungua e mātou he kairangahau matatika, e waia ana ki te mahi tahi, ka mahi hoki ki ngā momo raraunga matatini puta noa i ngā rāngai kanorau.

Ko tā Te Pūnaha Matatini he whakarite kāinga haumaruru e whanake ai a ngāi kairangahau.

Our values

Manaakitanga

Reciprocal care for others and recognition and return of mana in relationships

Tika

Doing the right and proper thing

Tapu

Ethical behaviour that acknowledges the intrinsic and sacred value of each and every person and thing

Pono

Truth, genuineness and ethical behaviours

Te kawau mārō



Complexity science enables new ways of seeing and understanding the world.

When birds flock for flight, they move from an individual state to a highly ordered structure that enables them to move together, aiding their collective journey. The kawau, or shag, extends its neck as it prepares to dive. Maniapoto's military strategy — te kawau mārō — is based on coordinated collective action that punches through existing barriers to create beneficial new outcomes.

In reducing the world to its constituent parts, the traditional frameworks of our universities and national research institutes fail to describe how people, the economy, and the environment can, do and must relate to each other. The key features of complexity science — connections, feedback, attractors, intervention points, critical transitions, and emergence — all offer new, innovative ways of tackling societal problems.

The flight of the kawau reveals how seeing and understanding the structures behind phenomena can bring unexpected insights.

Kia mau ki tēnā

Kia mau ki te kawau mārō

Whanake ake! Whanake ake!

Stick to that, the straight-flying cormorant!

– Maniapoto

Mā te rangahau matatini e hua ai he tirohanga hou, he māramatanga hou anō ki te ao.

Ka apū haere ana te rere a te manu, ka huri te āhua o te whakarite - nāwai i takitahi te āhua, ka kuhu kē ki tētahi rāngai kua āta whakaraupapatia, e tapatahi ai te rere, e ngāwari ake anō ai te haere ngātahi. Ka whātaimai te kawau, nōna e whakarite ana ki te ruku. Hei tūāpapa mō te rautaki pakanga a Maniapoto ko te koke ngātahi kia turakina ai ngā tauārai, e puta ai ko ētahi painga hou e whaihua ana.

I te āhua o te āta wāwāhitia o te ao hei wāhi motuhake, kāore e oti i ngā anga whakahaere auraki o ō tātou whare wānanga me ngā whare rangahau ā-motu te āta whakaahua i te āhua e honohono nei te tangata, te ōhanga me te taiao ki a rātou anō, me te tika o te pērā. Ko ngā āhuatanga matua o te pūtaiao matatini - arā, ko ngā hononga, ngā whakahokinga, ngā wāhi whārite, ngā wāhi panoni, ngā whakawhitinga whai tikanga nui, me te mahi ngātahi – hei huarahi hou, hei huarahi auaha anō hei rongoā i ngā raru ā-pāpori.

Ko tā te rere a te kawau e whakatauiria mai ana, mā te aro, mā te whai māramatanga anō ki te hanga o tētahi momo āhuatanga, e kitea ai pea he māramatanga kāore i whakapaetia.



Director's report

Kia mau ki tēnā, kia mau ki te kawau mārō

Hold fast to that, hold fast to the swoop of the shag

In 2023, Te Pūnaha Matatini continued to gather speed and focus, with the aim of ensuring our research is relevant, excellent, and well communicated. We have worked to strengthen the relationships between our investigators, emerging researchers and communities, and welcomed new investigators. Nau mai, haere mai, tauti mai to all our new folks.

With an overarching goal of building transdisciplinary and complex systems expertise, we continue to invest in opportunities for both emerging researchers and investigators. A highlight of the year was the annual hui, beginning at Pūrekireki marae near Pirongia, the tūrangawaewae of Kaumātua Professor Tom Roa. Wānanga on marae create alternate spaces to critique ideas, challenge research perspectives and build new connections.

We refreshed our three Communities of Inquiry (COIs) this year with a planned change in leadership. I thank all those who have committed their time and energy to COI leadership, and who are now stepping back. Exciting initiatives from the COIs ranged from online opportunities to in-person workshops, all of which were ably supported by the management team.

Although the effects of the Covid-19 pandemic remain with us, our core projects and seed funding have led to new scholars beginning their PhD and postdoctoral journeys, and new partnerships with communities and industry. The whānau group for emerging researchers continues to lead with fresh ideas to bring people together. Te Pūnaha Matatini's commitment to a new generation of scholars and critical thinkers has also led to exciting opportunities to engage tamariki across the motu, and even as far as Rēkohu, the Chatham Islands.

Te Pūnaha Matatini continues to strategically establish its identity as a leader in complex systems research. As part of this, we welcome Professor Markus Luczak-Roesch as co-director from January 2024. Markus brings a wealth of experience in information research and complexity science to complement the current expertise of the directorate.

In all of our endeavours, our goal is to lead with care for people, keeping complexity at our heart, and acknowledging the many in achieving our goals. In so doing, we as the kawau take flight and are best able to find our way.

Ngā manaakitanga,

Associate Professor Priscilla Wehi
Director, Te Pūnaha Matatini



Board Chair's report

Te Pūnaha Matatini has continued to make good progress on its activities throughout 2023.

I am particularly interested in the societal issues that Te Pūnaha Matatini is investigating, and which are detailed in this report. The societal challenges that we face are complex, systemic, seemingly intractable issues, about which decisions must be made by individuals, whānau, communities, civil society, government and policy makers.

A powerful example of Te Pūnaha Matatini's contribution to evidence-based decision making in addressing these challenges is the 'Ngā ara hou ki te ora | New pathways to wellbeing' project that is modelling healthcare delivery and optimising for justice, equity and efficiency.

In early 2023, Te Pūnaha Matatini welcomed 35 new principal investigators from across Aotearoa, which was an exciting influx of fresh ideas and new skillsets to our transdisciplinary community. It was immensely gratifying that there was so much interest in joining this Centre of Research Excellence, which reflects the calibre of research that it produces and the engaged community that it has created.

Alongside these new investigators, Te Pūnaha Matatini also brought on board three new partner organisations: NIWA, Toha and the Cawthron Institute.

In the latter half of 2023, Te Pūnaha Matatini sought to strengthen its directorate by appointing a co-director. I am thrilled that Professor Markus Luczak-Roesch will join Associate Professor Cilla Wehi as co-director from 1 January 2024. Associate Professor Mike O'Sullivan will remain deputy director to complete the directorate.

Te Pūnaha Matatini is heading into 2024 with a strong leadership team, valuable new partnerships, a wealth of new talent, and a clear vision of research excellence in complex systems, and I look forward to what the future will bring for this unique and valuable contributor to Aotearoa's research system.

Richard Aitken
Consulting engineer (retired)
Advisory Board Chair, Te Pūnaha Matatini

TPM Whānau report

Written by TPM Whānau Chair Aisling Rayne.

TPM Whānau is often described as a home for early career researchers who may not otherwise feel belonging in the research system. It has certainly been so for me, and it was a special privilege to lead TPM Whānau this year alongside the committee.

Our retreats continue to provide valuable opportunities for mutual learning and (re)making connections. This year's annual retreat in Whāingaroa Raglan was attended by 30 TPM Whānau members over four days. Participants engaged in research presentations, a lively discussion on complexity and a methods market for people to share skills with one another. We also enjoyed guest talks from Te Pūnaha Matatini Principal Investigators Associate Professor Dianne Sika-Paotonu and Mckayla Holloway. Our writing retreat on the Kāpiti Coast was attended by 13 members, offering a more intimate space for focused work.

In response to requests for more regular connection, regional hui were started in Wellington, Auckland and Christchurch. These have been well attended, and I'm excited to see this initiative grow in the future.

2023 once again highlighted the exceptional work of Te Pūnaha Matatini's early career researchers. TPM Whānau members have presented in webinars, at conferences – including the Capital City Complex Systems Symposium – at retreats and the annual hui. There has been success in publications, funding and awards, including recipients of Royal Society Ngā Puanga Pūtaiao Fellowships, Marsden funding and Teaching Excellence Awards. I have also been impressed by public engagement through blogs and national webinars. Above all, it has been a delight to see Te Pūnaha Matatini's values – manaakitanga, tika, tapu and pono – shine through in people's leadership, research and day-to-day interactions. I am heartened to see these values also strongly represented in the 2024 committee, chaired by Anjuli Muller, and look forward to seeing TPM Whānau grow and thrive.

Te Pūnaha Matatini Whānau Committee 2023

Chair: Aisling Rayne

Vice Chair: Bethany Cox

Immediate Past Chair: Neil Birrell

Secretary: Henry Morse

Treasurer: Ngaio Balfour

Communications Officer: Mona Soltani

Events Coordinator: Anjuli Muller

Committee Member: Patricia Pillay

Committee Member: David Kelley



Communities of Inquiry

Our three Communities of Inquiry (COIs) provide a scaffold to all research activity within Te Pūnaha Matatini, each with a clearly defined purpose intended to ensure excellence and consistency with respect to:

- **The complexity science at the heart of our research.**
- **Our values-based partnership approach that is appropriately engaged with relevant communities right from the start.**
- **Our commitment to uncover, evaluate and actively work to overcome systemic barriers and inequities in the research, science and innovation system.**



Complexity COI

The Complexity COI provides leadership in the development and application of complex systems methods. It aims to empower investigators and students to work collaboratively and ethically on big data, including national databases, and the modelling and analysis of complex systems in a diverse range of applications and contexts.

Leadership:

- Associate Professor Ilze Ziedins
- Professor Michael Plank
- Associate Professor Matthew Parry

Engagement COI

The Engagement COI is an opportunity for anyone involved in Te Pūnaha Matatini to connect with others who are interested in communication and engagement – be that sharing experiences, learning new skills, getting involved in hands-on activities, developing new ideas or simply meeting like-minded people. Supported by a vibrant core of Te Pūnaha Matatini energy, we are enabling those who want to become champions, knowledge-holders and agents for engagement activities within their own Te Pūnaha Matatini projects, research groups and home institutions.

Leadership:

- Associate Professor Rhian Salmon
- Associate Professor Daniel Hikuroa
- Mckayla Holloway

Culture of Research Excellence COI

The Culture of Research Excellence COI grows a culture of research excellence by supporting inclusive, interdisciplinary research teams, that acknowledge tangata whenua, the aspirations and needs of communities, and that demonstrate theoretical rigour to nurture and innovate ideas from inception to publication.

Leadership:

- Associate Professor Krushil Watene
- Associate Professor Tammy Steeves
- Victoria Agyepong (until June 2023)
- Dr Sereana Naepi (from October 2023)

Engagement Incubator

The Engagement Incubator is a key part of the structure of Te Pūnaha Matatini that supports researchers to embed engagement from the start of their projects.

The Engagement Incubator:

- Develops pathways that enable Te Pūnaha Matatini researchers and research projects to be engaged with the ethical, socio-political, cultural, economic, and environmental contexts of the proposed research, and appropriate tools for respectful engagement with Te Tiriti o Waitangi partners, communities, and stakeholders.
- Creates opportunities for stimulating ideas and providing training in research engagement and impact, including engagement to inform policy-making and engagement with communities.
- Provides a safe space to interrogate and catalyse critical conversations about the practice of research, including topics such as data ethics, open science, engagement with Māori and Pacific communities, and being self-critical about equity, diversity, inclusion and access in our workplaces.

People:

- Associate Professor Rhian Salmon
- Jo Bailey
- Jessica Rohde



The Observatory

The Observatory is a small yet pivotal feature of the structure of Te Pūnaha Matatini that finds ‘explosive’ issues growing toward tipping points where Te Pūnaha Matatini can shape positive transformation.

Aotearoa New Zealand, and the world, face critical challenges which are interconnected and complex. Best practice decision-making relies on responsive, reflexive, contextualised and relevant evidence-based research which is accessible to all decision-makers.

The Observatory scans the horizon and gathers information about new and upcoming likely intervention points with a focus on emerging issues for Aotearoa New Zealand where complex systems research can create meaningful impact.

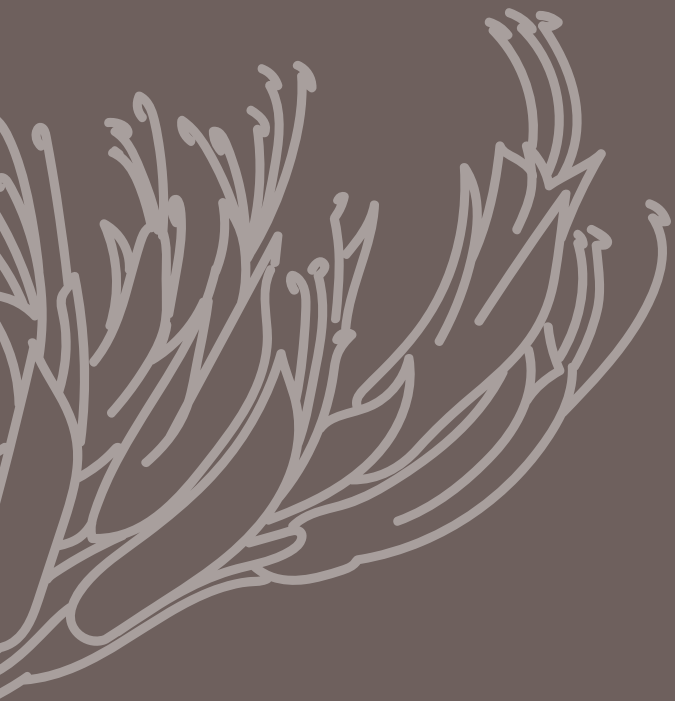
People:

– Professor Troy Baisden





Our research



Impact areas

Our core research projects for 2021–24 are organised into four interrelated impact areas, which relate to the United Nations Sustainable Development Goals.

Our changing climate

Projects which explore the links between climate change impacts, mitigations, and civil society, from anthropogenic impacts in Antarctica, to rivers as testcase ecosystems for mitigation approaches, and Aotearoa New Zealand's unique braided rivers in social and environmental decision-making. These connected projects tease out the complex relationships between governmental and inter-governmental policy, environmental flourishing, and human approaches to environments, using complex systems models and methods to examine these data.



Achieving sustainable and resilient river ecosystems in Aotearoa under climate change

Leveraging data and models to identify solutions to increase the resilience of river ecosystems to uncertain futures both nationally and globally.

Associate Professor Jonathan Tonkin (Project Lead) | Professor Michael Plank | Dr Rachelle Binny | Dr Andrea Tabi



Braided rivers: The land the law forgot

Integrating legal, economic, social, and cultural factors into the well-established models of the topology of braided rivers, along with models of climatic uncertainty to better understand these unique landscape features.

Professor Ann Brower (Project Lead) | Professor Alex James | Renate Vosloo | Aimee Calkin | Andrew McKaskell



Human activity in the McMurdo Dry Valleys. Rescue, knowledge and understanding our role as a vector of change

Accessing, rescuing, and analysing the vast range of (mostly hidden) historical information about human activities in this geographically and scientifically distinctive region.

Dr Fraser Morgan (Project Lead) | Professor Rebecca Priestley | Dr Pierre Roudier | Associate Professor Claire Postlethwaite | Professor Thegn Ladefoged | Associate Professor Priscilla Wehi | Kristin Wilson

Building a just and equitable society

Projects ranging from evaluating the effectiveness of researchers' impact on policy, to culturally safe primary healthcare delivery, the revitalisation of te reo Māori, and the impact of the distrust of science. These interlinked projects provide the underpinning to utilising complex systems approaches in order to build a more just civil society.



Ebbs and flows of knowledge and influence across the science-policy interface

Studying the influence of scientific research on science policy, and the influence of science policy on scientific research, in Aotearoa New Zealand.

Dr Kyle Higham (Project Lead) | Dr Mubashir Qasim | Professor Troy Baisden | Dr Bernardo Buarque



Te ara o te reo Māori The trajectory of the Maori language

Collating, analysing and transforming data on te reo Māori into an assessment of the current and future trajectory of the language.

Associate Professor Rachael Ka'ai-Mahuta (Project Co-lead) | Professor Michael Plank (Project Co-lead) | Associate Professor Markus Luczak-Roesch | Michael Miller



Ngā ara hou ki te ora New pathways to wellbeing

Modelling healthcare delivery and optimising for wellbeing, justice, equity and efficiency.

Associate Professor Ilze Ziedins (Project Lead) | Associate Professor Krushil Watene | Associate Professor Cameron Walker | Associate Professor Marama Muru-Lanning | Associate Professor Michael O'Sullivan | Yvonne Li



Science, statistics and the media

Investigating how particular communities in Aotearoa New Zealand use the language, markers and tools of science and technology to promote non-credible scientific and social scientific claims.

Professor Rebecca Priestley (Co-lead) | Professor Richard Arnold (Co-lead) | Associate Professor Krushil Watene | Zoë Brown | April Boland

Better models and methods

Projects which focus on developing better, more transparent and equitable algorithms, exploring the mathematical roots of emergence and investigating network structure in multilayer networks, with real world applications. These projects collectively develop and test new complex systems methods and models.



Evolutionary game theory of Bellman agents

Investigating the origin of cooperation using evolutionary game theory.

Associate Professor Marcus Frean (Project Lead) | Dr Chrissie Painting | Professor Stephen Marsland | Eduardo Mossman



Spreading processes on (multilayer and multiplex) networks

Understanding how the outcomes of spreading processes on real-world networks are affected by the multilayer and multiplex network structures and by different network topologies.

Associate Professor Claire Postlethwaite (Project Co-lead) | Dr Dion O'Neale (Project Co-lead) | Dr Emily Harvey | Dr Reju Sam John | Satoshi Komuro



Kindness in Science

Developing a culture of inclusion which sustains the robust discourse essential for science but does not come at the expense of the dignity of those who participate.

Professor Tammy Steeves (Project Lead) | Dr Emma Sharp | Dr Leilani Walker | Associate Professor Kirsten Locke | Dr Shaun Hendy | Associate Professor Priscilla Wehi | Associate Professor Anna Matheson | Dr Aisling Rayne | Associate Professor Markus Luczak-Roesch | Dr Sereana Naepi | Bethany Cox



Maths Craft in a Box

Making maths accessible in new ways to support the vital work of maths teachers across the country.

Dr Jeanette McLeod (Project Lead) | Dr Phillip Wilson | Jo Bailey | Dr David Pomeroy



The Co-production Project

Developing knowledge of co-production in order to improve use of this method in an Aotearoa New Zealand setting.

Professor Anna Brown (Project Lead) | Associate Professor Faith Kane | Associate Professor Siouxsie Wiles | Associate Professor Rhian Salmon | Jo Bailey | Anjuli Muller | Eleanor McGeachie

Human and environmental health and wellbeing

A collection of projects which focuses on balancing the demands and rights of human society and the environment. Examining economic benefits of the nature of knowledge flows, through to systems mapping to understand the relationships between human and environmental health, this impact area reviews archaeological data about land management and use through a mātauranga (Indigenous knowledge) lens and develops artificial intelligence methods to improve Aotearoa New Zealand's bioprotection.



Ki te toi o te ora: System change to reverse health inequality and environmental degradation

Creating a system-wide map to identify effective levers for systems change in the interrelated complex systems reproducing health inequalities and environmental degradation.

Dr Anna Matheson (Project Co-lead) | Professor Troy Baisden (Project Co-lead) | Associate Professor Daniel Hikuroa | Dr Dion O'Neale | Professor David Hayman | Associate Professor Krushil Watene | Dr Lynn Riggs | Associate Professor Rachael Ka'ai-Mahuta | Justin Connolly | Holly Hart



Kaitiakitanga and the ecodynamics of early Māori horticulture

Investigating how Māori drew on the knowledge of the founding Polynesian ancestors and developed unique perspectives and practices in response to the Ahuahu Great Mercury Island landscape.

Professor Thegn Ladefoged (Project Lead) | Dr Pierre Roudier | Associate Professor Daniel Hikuroa | Professor Melinda Allen | Dr Rebecca Phillipps | Dr Matiu Prebble | Associate Professor Priscilla Wehi | Professor Tom Roa | Professor Michael Plank | Dr Emily Harvey | Dr Zac McIvor | Alexandra Queenin



Networks of knowledge sharing

Understanding the driving forces of knowledge propagation through communities and to investigate whether aspects of this process can shine light on quality and/or value associated with certain items of knowledge.

Professor Uli Zuelicke (Project Lead) | Professor Jens Dietrich | Dr Mubashir Qasim | Dr Kyle Higham | Nkiru Ede



Towards a better understanding of artificial intelligence and its interaction with its environment

Developing new tools to both understand the consequences of interactions between artificial intelligence (AI) and the systems they purport to study.

Dr William Godsoe (Project Co-lead) | Associate Professor Claire Postlethwaite (Project Co-lead) | Dr Emma Sharp | Victoria Agyepong

Clusters

Clusters bring researchers at Te Pūnaha Matatini together over shared interests and ideas

Climate Change

A group of Te Pūnaha Matatini investigators and TPM Whānau is working on climate change impacts, mitigation and adaptation across social and ecological spaces.

Climate change is one of the biggest challenges facing the planet. This cluster will bring together researchers from across Te Pūnaha Matatini to work across fields of expertise to make a real and measurable difference to understanding climate change impacts and find solutions. We will support research development processes and facilitate knowledge transfer. We aim to be inclusive and welcome input from all members of Te Pūnaha Matatini.

Coordinators: Associate Professor Cate Macinnis-Ng, Professor Adrian McDonald

Aotearoa Food Futures

Bringing together people with broad interests in food systems, including food production, distribution, consumption and their complex relationships.

Our transdisciplinary research cluster examines complex relationships with and within food systems – inclusive of food production, distribution, and consumption. Recognising diverse understandings of the role and value of food, our food systems community draws on local and global knowledge to chart just and resilient food futures for Aotearoa New Zealand. Incorporating socio-cultural, environmental, economic, as well as political and scientific imperatives, we bring together people with interests in food security and food sovereignty to address a range of complex food-related challenges related to social and environmental justice including poverty, climate change, and resource use.

Coordinators: Dr Aisling Rayne, Dr Emma Sharp

Healthcare

Using complex systems modelling to understand and improve healthcare systems.

Health and wellbeing are fundamental to both individuals and society. The systems that provide support and deliver care for both health and wellbeing are complex and overburdened. This cluster will provide complexity science approaches that are qualitative, quantitative and a hybrid of both to better understand, model and improve healthcare systems.

Coordinators: Associate Professor Ilze Ziedins, Dr Tom Adams

Storytelling

Building capacity within Te Pūnaha Matatini to tell interesting, expansive, creative and articulate stories using different modes of communication.

Storytelling is an important way to connect our research with multiple audiences! Early opportunities to practise storytelling have been crucial in the careers of science communicators like Associate Professor Siouxsie Wiles and Dr Shaun Hendy, and the storytelling cluster aims to provide a safe space for Te Pūnaha Matatini investigators and TPM Whānau to develop this skill.

Coordinators: Professor Anna Brown, Jonathan Burgess

Seed funding

Te Pūnaha Matatini provides seed funding to start new research projects, to run research-related hui or workshops, or for support of publication and dissemination of research. Individuals or small groups from Te Pūnaha Matatini, including TPM Whānau, can apply. Applications for seed funding are reviewed quarterly at the Strategic Leadership Group meetings.

In 2023, Te Pūnaha Matatini awarded seed funding of \$662,046 to 20 initiatives.

| Project | Researchers involved | Seed funding awarded |
|---|--|----------------------|
| Aotearoa's past, present and future food | Emma Sharp, Kenzi Yee | \$25,000 |
| Gender equity research assistant funding | Ann Brower, Alex James, Franca Buelow, Liam Gibson | \$45,000 |
| Pasifika student support | Alex James, Christoinette Tausa | \$25,500 |
| Causal invasions (fruit fly) | Tom Moore, Will Godsoe, Elena Moltchanova, Phillipp Wacker, Lloyd Stringer, Giulio Valentino Dalla Riva, Pooja Baburaj | \$45,000 |
| Conservation physiology in alpine insects | Cilla Wehi, Evie Virens, Jo Monks, Tara Murray | \$55,000 |
| Outreach on Rēkohu Wharekauri Chatham Islands | Chrissie Painting, Tammy Steeves, Liz Parlato, Roseanna Gamlen Greene | \$11,460 |
| Love the science, hate the scientist | Rebecca Priestley, Richard Arnold, Alex Beattie | \$18,166 |
| Youth wellbeing in uncertain times: The voices of rangatahi from flood-affected Tairāwhiti Gisborne | Holly Thorpe, Samantha Holdsworth, Patrick McHugh, Hiria Phillip-Barbara, Dan Hikuroa | \$38,400 |
| Immunity debt masters funding | Alex James, Miguel Moyers-Gonzalez, Nikki Moreland, Reuben MacGregor | \$25,000 |
| Pacific futures: The lives of highly qualified Pacific Peoples | Sereana Naepi, Joanna Kidman, Reremoana Theodore, Jesse Kokaua, Tara McAllister, Hine Funaki | \$25,000 |
| Re-storying: Art and science collaborative knowledge translation project for change | Sereana Naepi, Marc Conaco, Ema Tavola | \$37,000 |
| Wairewa Roto as a functioning organ | Graham Donovan, Matiu Prebble | \$16,900 |

| Project | Researchers involved | Seed funding awarded |
|---|--|-----------------------------|
| Exploring agroforestry as complex systems in Aotearoa | Sandra Velarde, Troy Baisden, Cate Macinnis-Ng, Emma Sharp | \$21,604 |
| Rational actors and the global commons | Quentin Atkinson, David Kelley | \$32,843 |
| Communicating feedback complexity to diverse communities. The case of climate change adaptation decision-making for health and wellbeing in South Dunedin. | Alex Macmillan, Sarah Harrison | \$60,000 |
| Whānau living with te reo Māori language trauma | Tom Roa, Raukura Roa, Robbie Neha | \$32,873 |
| Mapping the transdisciplinary modelling research landscape | Mike O’Sullivan, Piaras Kelly | \$15,000 |
| Wellbeing and cultural heritage in extended reality | Zac McIvor, Hitaua Arahanga-Doyle | \$65,000 |
| Niche modelling of karaka (<i>Corynocarpus laevigatus</i>) to identify plant management by hapū-Māori in Te Ūpoko-o-te-ika (southern North Island, New Zealand) | Zac McIvor, Latisha Lee, Pierre Roudier, Ian Barber | \$25,300 |
| Risk mapping for emerging disease threats in Aotearoa | Dion O’Neale, Emily Harvey, Jesse Whitehead, Matt Hobbs | \$42,000 |

Sponsorship

- The Siouxsie Project Ltd, \$5000
- International Network of Women Engineers and Scientists ICWES19 conference, \$3500
- Government Economics Network Annual Conference 2023, \$2500
- Rebecca Priestley ‘End Times’ book launch, \$435
- Women in Maths and Science Network retreat, \$1500
- Science Communicators Association of New Zealand conference, \$3000





Our stories

Impact statement

- We work with stakeholders from industry, government, and the public to help reshape Aotearoa New Zealand's economy, society, and environment.
- We train a new type of scientist for the benefit of Aotearoa New Zealand.
- We help build the kind of Aotearoa New Zealand of which we can all be proud.
- We support te ao Māori.

The following stories demonstrate how we have been making an impact in these areas.





Helping the lungs of an ancestor to breathe freely once again

The sun is setting at Te Mata Hāpuku. The eelers of Ngāi Tahu have been hard at work digging kōawa, drains that stretch across the cobble flats between Te Roto o Wairewa and the ocean. Beside these drains sit pārua, pits dug into the earth waiting to be filled with the annual harvest of tuna, the eels that are the customary fishery for whānau members.

After sunset, the eelers settle in to wait. As the tide rises, saltwater percolates through the beach cobbles, reaching the kōawa. The smell of this saltwater sends a signal to the tuna in the lake. For them, it's time to begin a remarkable journey, the tuna heke.

Te Roto o Wairewa is an intermittently closing and opening lake on the southern side of Te Pātaka o Rākaihautū, Banks Peninsula. Each summer tuna depart from here on their heke, a migration across the ocean to the Tongan Trench to breed. Like almost all of the coastal lakes around Aotearoa New Zealand, Wairewa is in bad shape, although it has been improving in recent years. It is a very shallow lake, averaging only one to three metres in depth. Forest clearance, wetland drainage, pest and weed incursion, and intensification of land usage have all degraded the lake and its catchment.

When the shallow waters of Wairewa are warm, stagnant, and overly rich in nutrients like phosphorus and nitrogen from fertiliser runoff or septic tank overflows, cyanobacterial blooms form. These toxic blooms make it unsafe for swimming, and can be lethal for local tuna populations – or for anyone who might eat them. A particularly nasty bloom in the early 2000s killed 1,000 eels on the lake.

Te Pūnaha Matatini Principal Investigator Dr Matiu Prebble (Ngāti Irakehu, Ngāi Tahu) is |a tangata tiaki, one of the caretakers of the lake who issue permits locally to whānau members of Ngāi Tahu who harvest eels from January to April.

There are three monitoring stations on the lake which the Cawthron Institute and Environment Canterbury use to sample water quality. Researchers at the Cawthron Institute analyse these samples for algal cell counts of cyanobacterial blooms, and if dangerous levels are reached, a warning is sent out through Te Whatu Ora – Health New Zealand.

“It’s difficult to make a decision on whether to go ahead with eeling when there has been a bloom,” explains Matiu. “We don’t get any of the data until a month later showing us what is happening in the lake. So we don’t actually know what this means for the eel fishery on the lake in real time.”

This is where the tools of complex systems can be useful. The appearance of a bloom can be thought of as a tipping point, when the complex system of the lake undergoes an abrupt transition between a clear, healthy state and cloudy, polluted state based on changes in underlying conditions such as phosphorus levels.

Matiu and fellow Te Pūnaha Matatini Principal Investigator Associate Professor Graham Donovan have seed funding from Te Pūnaha Matatini to analyse the wealth of monitoring data from the lake from a temporal and spatiotemporal tipping point perspective and develop a predictive model to inform future monitoring, predictions and potential interventions.

Graham has experience modelling bodily organs, and looking at other tipping points – such as asthma attacks in asthmatic lungs. He is interested in early warning signals that can be identified in data from asthmatic lungs that signal an impending asthma attack.

This work resonated with Matiu, as Ngāi Tahu envisage Wairewa as a bodily organ. When Ngāi Tahu ancestor Makō first laid claim to the area, he was very taken by the richness of mahinga kai or



traditional foods that were available there, particularly the eels. He laid claim by saying “Taku pane ki utu, aku waewae ki tai,” or “Inland a pillow for my head and on the shores a rest for my feet.”

“Wairewa is the whakatinanatia or embodiment of Makō,” says Matiu. “For the last century, it’s been a poorly functioning organ of his body. At the moment it could be thought of as a poorly functioning bladder, but what we really want the lake to be like is a highly functioning organ like a lung.”

“I saw Graham speak about his work on modelling bodily organs, and this approach really resonated with me given how we think about the lake,” says Matiu. “There’s a lot of potential in utilising his complex systems approaches to bodily organs to come up with new ideas about how we can address some of the problems in these lakes.”

Seed funding has created a unique project that could only have originated within Te Pūnaha Matatini. This funding paid for two summer interns to work on the project: Tavake Tohi (Tonga) in Auckland, and Madeleine Barber-Wilson (Ngāti Kahungunu ki te Wairoa, Ngāti Ruapani mai Waikaremoana) in Christchurch.

Tavake has a background in geographic information systems, and has been analysing satellite imagery and data from a multispectral drone to explore the spatial dimensions of blooms on the lake. He also has a personal connection to the heke of the eels, as they are also harvested in his village in Tonga at the other end of their migration.

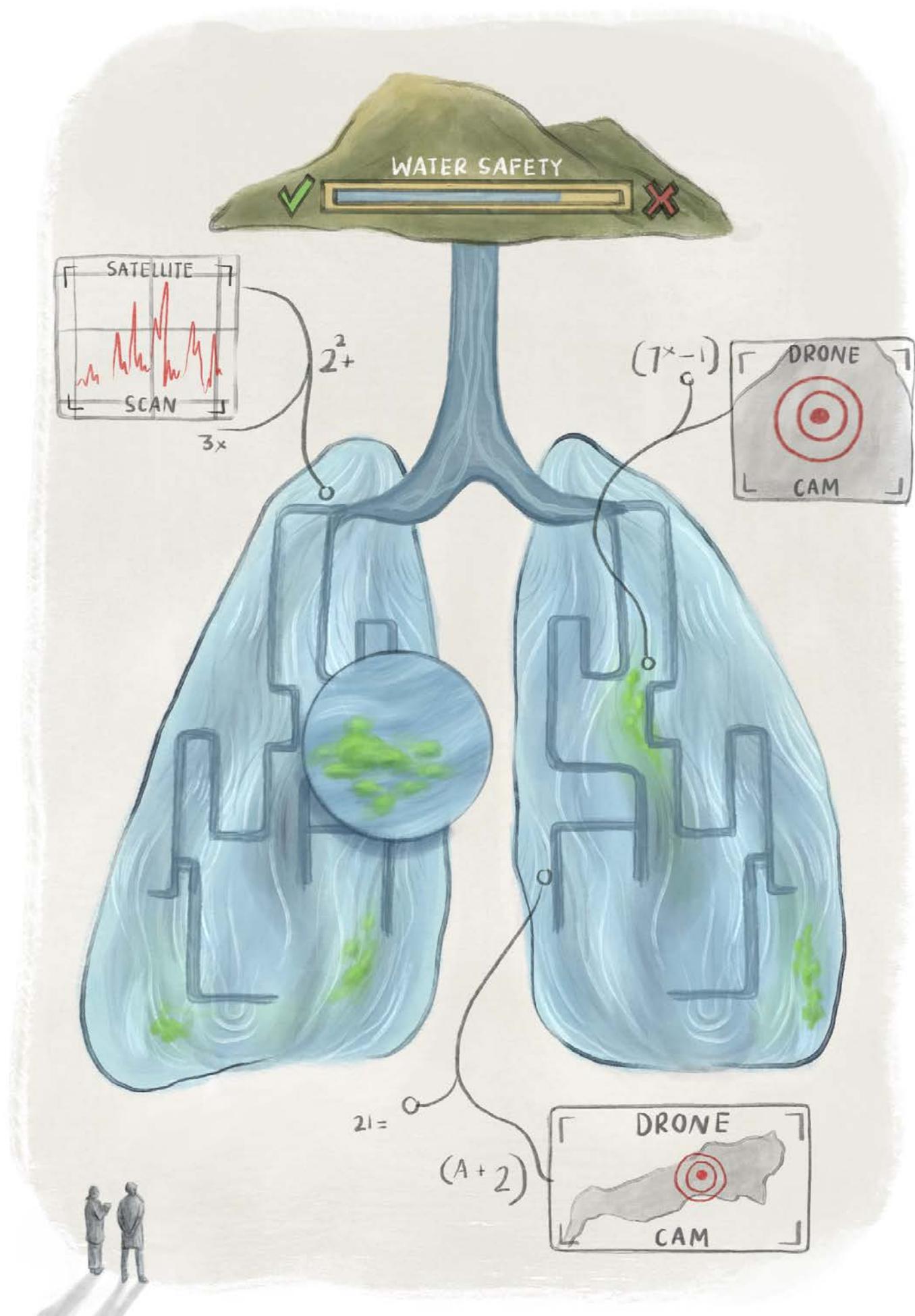
Maddie has simultaneously been analysing years of water monitoring data to understand the lake as a temporal system. “Critical transitions between cloudy, polluted states and clear, healthy states in shallow lakes can be modelled mathematically,” says Maddie, “and our goal is to use a model to find mathematical early warning signals of changes in state for Wairewa. Restoring the health of this lake means protecting a source of mātauranga and kai for iwi and hapū of the rohe. I’m excited to be putting my maths skills to work in the real world and am hoping that the results of our project will be helpful for future kaitiaki of the lake.”

Applying modelling approaches usually used for bodily organs to a lake is pushing the boundaries of complex systems theory and its real-world application. “This project is about both extending complex systems theory, and applying this to the lake as a spatiotemporal system,” says Graham. “We have water sampling data from multiple locations at different times, and visual data from satellites and drones. Where we really want to get to is what we call spatiotemporal early warning signals, looking at how the lake changes in both time and space.”

“The lake is very long and narrow,” continues Graham. “It’s not one dimensional, but it has a very significant length from the headwaters down to the flat, and not much width. So if you can incorporate data from all these sources in a stratified structure, can you get more accurate early warning signals than you could by just looking at the temporal data alone?”

This work is of central importance to the Wairewa community, and has broad engagement from Wairewa Rūnanga, the Birdlings Flat community, the Christchurch City Council, Environment Canterbury and the Department of Conservation. About 20 years ago, Charisma Rangipunga put forward the wero “ka haha te tuna ki te roto, ka haha te reo ki te kāinga, ka haha te tangata ki te whenua.” If the lake is breathing and full of tuna, and the houses full of language, the people will be well. But if there are no eels or language, the people will suffer.

“If we don’t have our tuna there,” concludes Matiu, “then we might as well pack up and leave, basically.”





Intervening in complex food systems to improve food security

In certain areas of Australia, millions of sterile male fruit flies rain from the skies every two weeks. These Queensland fruit flies are reared to the peak of health in a special facility, then sterilised through irradiation, before being loaded into an aeroplane and dropped from the air. When the sterile males mate with local females, the females are unable to lay viable eggs.

This method effectively suppresses fruit fly populations, which cost Australian growers hundreds of millions of dollars a year in damaged fruit, pest control and lost market access opportunities. But is this too many sterile fruit flies to drop from the skies? TPM Whānau member Dr Tom Moore wants to know.

The Queensland fruit fly is an important pest of concern for Aotearoa New Zealand. Although there have been multiple detections in Aotearoa, the fly has not yet established a foothold. But this comes at a cost. In the most recent incursion, 11 male flies were caught on Auckland's North Shore – at a cost of \$18 million.

Tom is a quantitative ecologist who specialises in integrating scientific hypotheses into statistical models to address causal questions. He is particularly interested in understanding how invasive species establish themselves through data that spans across time and space. Aotearoa relies heavily on its biological resources, so this sort of agricultural research plays a pivotal role in our economic prosperity and shaping a sustainable future.



“Current methods of controlling fruit fly populations are effective,” says Tom, “but without a deeper understanding of the causal processes at work these could become less efficient due to future change, resulting in unnecessary costs.”

Tom has seed funding from Te Pūnaha Matatini to explore new methods of causal inference, which is the process of determining the independent effects of the individual parts that make up larger systems. Causal inference techniques drawing on interdisciplinary methods linking mathematics, computer science and statistics have become popular in other parts of the world, but are not yet widely used in Aotearoa.

Current statistical approaches can be limited in their ability to identify causal relationships. “It’s very common to collect a lot of data without a targeted question, chuck it in all in a model, and see what comes out the other side,” says Tom. “Richard McElreath calls this a ‘causal salad’. So while a certain model might make good predictions, it may be misleading in terms of causation, and unhelpful in planning interventions.”

Causal inference is a technique that considers how variables are related. This approach has been applied in other systems like economics, but is a new and developing technique in ecology. Developing causal models to support agricultural management decisions like the suppression of fruit flies has the potential to significantly improve our understanding of how to effectively intervene in these complex systems to improve food security in an uncertain future.

“By explicitly modelling cause and effect relationships in complex systems based on ecological theory,” Tom explains, “these techniques can evaluate if, and under what conditions, cause and effect relationships can be identified.” This project is an exciting opportunity to both develop complex systems theory, and to apply it to make a real difference to agriculture in Aotearoa.

Tom is working with a team including Te Pūnaha Matatini Principal Investigators Dr Will Godsoe and Dr Giulio Valentino Dalla Riva to develop a non-linear model of population dynamics using three years of weekly fruit fly trapping data.* They are also collaborating with entomologist Dr Lloyd Stringer from Plant and Food Research, and three colleagues from the University of Canterbury: statisticians Professor Elena Moltchanova and Dr Phillipp Wacker, and doctoral student in computational and applied mathematical sciences, Pooja Baburaj.

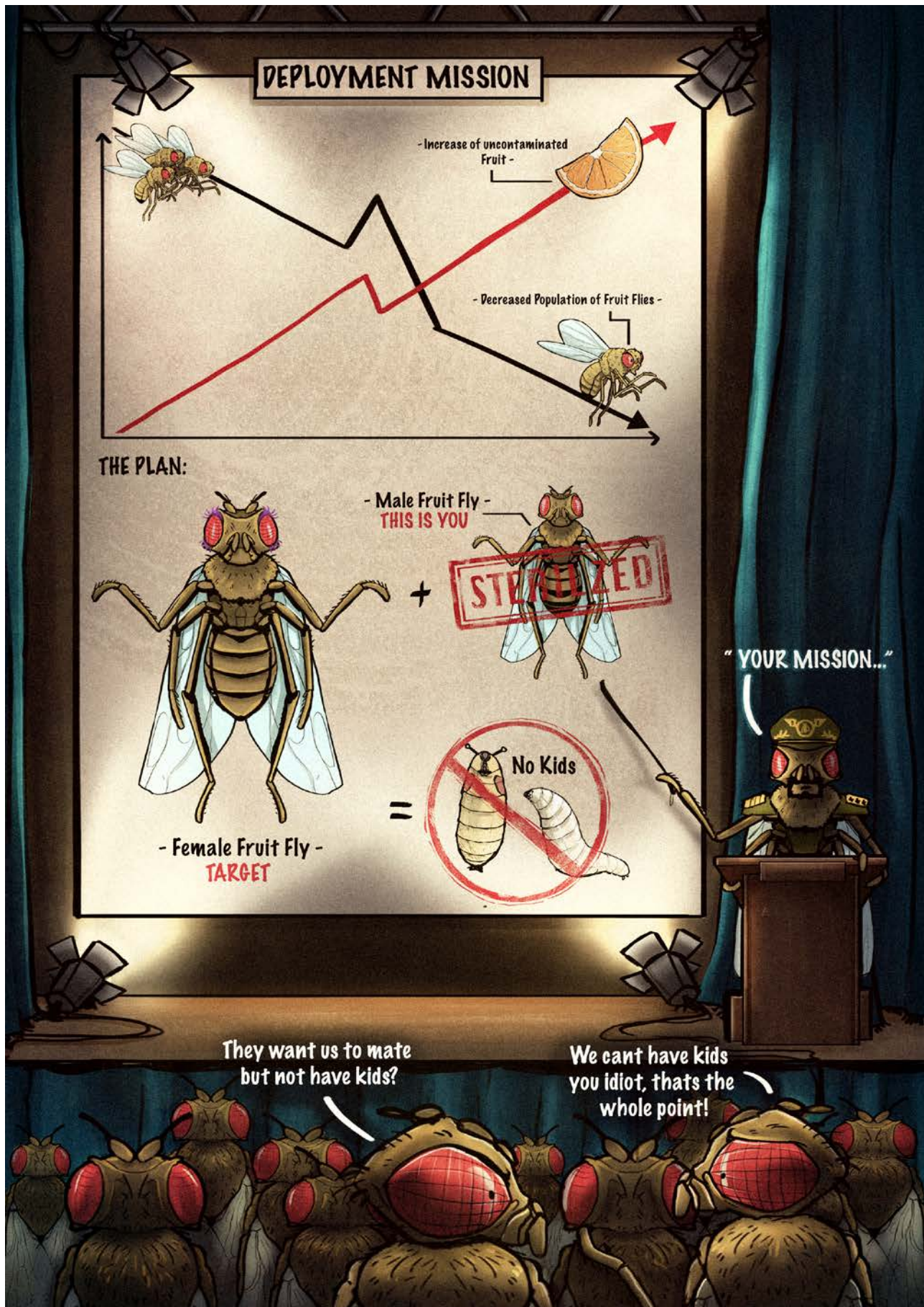
Tom and his team will then use this modelling approach to test out different biocontrol scenarios – exploring whether less frequent deployment of biocontrol measures can achieve the same population suppression. “If the model shows that you can reduce the frequency of biocontrol to monthly and the data looks the same, that’s a great outcome,” says Tom, “and would save a bit of money.”

The team is motivated to explore and showcase how causal inference can be used within the scientific process when defining hypotheses to generate more meaningful insights. Tom is especially excited about sharing this approach with his colleagues at Plant and Food Research and the broader research community, and hosting a workshop with Te Pūnaha Matatini colleagues to increase the capacity of the causal modelling of complex systems in Aotearoa. He hopes that this work will inspire interdisciplinary collaboration between agriculture, ecology and statistics.

Tom says that “we can ultimately use causal inference to predict where invasive species might spread, and how their population dynamics will manifest in a system, so that we can make evidence-based decisions on how to respond.”

“This is a way that we can solve real-world problems with innovative and evidence-based research.”

**This data was collected as part of the post factory pilot of SITplus fly production project (FF17001) that was funded by the Hort Frontiers Fruit Fly Fund, part of the Hort Frontiers strategic partnership initiative developed by Hort Innovation Australia, with co-investment from Macquarie University, New South Wales Department of Primary Industries, Plant and Food Research New Zealand, and contributions from the Australian government.*





Illustrations: Gemma Pledge.

Wings, webs and wonders on the Chatham Islands

Written by Chrissie Painting and Tammy Steeves.

You can't get much more remote than the Chatham Islands, a bumpy plane ride 840km east of Ōtautahi | Christchurch. Although the archipelago is made up of about ten islands, people live on just two: Rēkohu | Wharekauri | Chatham Island and Rangihau | Rangiauria | Pitt Island. The rest are wild places, uninhabited by humans but important refuges for many threatened species.

A poignant issue for Chatham Islanders is that many miheke | taonga | treasured species were once found on Rēkohu and Rangihau, but due to invasive predators are now restricted to these other islands that are tightly biosecurity-controlled and off-limits to the public. While visiting researchers are given the privilege to visit these remote islands, only a handful of residents have had the opportunity to interact with many of the species that make their islands unique.

With that challenge in mind, several Te Pūnaha Matatini investigators visited blustery Rēkohu and Rangihau in October 2023 to connect with the community through a series of school visits, hui and a public outreach event. Dr Chrissie Painting and Professor Tammy Steeves, both principal investigators at Te Pūnaha Matatini, together with Dr Roseanna Gamlen-Greene (TPM Whānau), Dr Elizabeth Parlato and Dr Morgane Merien made up our team of five wāhine from five institutes, joined together by our shared values and passion for science. We were also joined by two of our tamariki, who are both fabulous science communicators.



Our kaupapa was to facilitate connections: connections between scientists from mainland Aotearoa and the Chatham Island community, connections between Chatham Island people and endemic fauna, and connections between species (e.g. karure | kakarua | Chatham Island black robin and their invertebrate prey).

One of those species is the Rangatira spider, a gentle giant famous for spooking late night visitors to the long drop on Hokoreoreo | Rangatira island. It roams for wētā on tree trunks and is a relative to fishing spiders that have particularly whacky mating behaviour – which is what led Chrissie to propose her latest Marsden-funded project.

Despite a population size of only around 700 people, the Chatham Islands supports three schools: Kaingaroa, Te One and Pitt Island. However, the rolls are teeny tiny. At Kaingaroa, way up in the

far north-west corner of Rēkohu, our own tamariki doubled the roll for the day, with just two kids in the whole school!

Just Tammy and Tate made it to Pitt Island this time around, where they explored DNA extraction and genetic sexing of birds with four fabulous students, and shared a few stories of how Tammy and her team use genetic and genomic data to help save threatened birds. The full team visited Kaingaroa and Te One, adding pitfall trapping to monitor backyard bugs and bug treasure hunts to the list of activities.

We also organised a weekend public event called ‘Wings, Webs and Wonders’, scheduled to overlap with the one day a week that Bubbles opens her café – it’s the only place and time you can get a serious coffee on the island! We set up a bunch of stands where people could inspect their pitfall trap catches under a microscope, paint a 3D Rangatira spider, and make a bowl of spider soup. We also had a series of genetic and bird-focussed interactive activities where people could extract DNA from split peas, genetically sex birds, eat like a black robin, learn to use pipettes and even touch one of the original traps used by Don Merton to rescue the last of the Chatham Island black robins from

extinction. There was a great turnout, saved by the fact the final for the Rugby World Cup was the following morning and not at the same time as our event.

Our team also had several special visits with imi | iwi. We had conversations about our favourite study species on Kōpinga Marae (Hokotehi Moriori Trust) over an amazing kai while our kids got to know the local tamariki by doing ninja rolls over mattresses in the whareniui. Tammy and Liz had a special tour of the work done by Maui Solomon (Moriori Imi Settlement Trust) and Susan Thorpe at Manukau, and Chrissie and Liz shared stories over a cuppa tea with members of Ngāti Mutunga o Wharekauri Trust.

We were blown away by the hospitality of folks on the islands. Our team was treated to a visit to the rakau momori (sacred tree engravings) in the kopi forest at Rotorua,

where we learnt moving stories of the Moriori people. It would also be remiss to leave out mention of the TWO occasions we had crayfish donated to us, where Tammy got to introduce the team to Canadian ‘lobster rolls’. Chrissie’s daughter got to boogie with the locals at the annual Halloween Disco, and we all felt rejuvenated by a visit to The Gap where we helped Department of Conservation rangers plant trees perched on the cliffs above the wild waves below.

We are all counting the days until we can return to this special place and its people.

The team were generously supported by seed funding from Te Pūnaha Matatini, the University of Canterbury Vision Mātauranga Development Fund, and two Marsden Fast-Starts (awarded to Chrissie Painting and Liz Parlato).





Building authentic connections with communities

In June 2023, Te Pūnaha Matatini travelled to Kirikiriroa Hamilton for our annual hui. This was a new location for our annual hui, chosen to build connection with the community in Waikato, and find new perspectives.

The night before the annual hui, we were given the chance to noho marae at Pūrekireki, our Kaumātua Professor Tom Roa's marae near Pirongia. This was a valuable opportunity for our investigators to spend time in a marae setting to build authentic connections with the community there.

A group of 20 investigators was welcomed on to Pūrekireki with a pōwhiri and kai, and then participated in a deep session of whakawhanaungatanga, sharing where they are from, what is important to them, and how this relates to their research.

After dinner, these investigators were treated to kōrero from matua Tom about the whare tupuna at Pūrekireki, the ancestral meeting house Marutehiakina. It was a privilege to hear Tom speak about the house and people. To wānanga in such a place allows deep dives into both emotion and thinking, in a supportive and inclusive environment.

After dinner, Te Pūnaha Matatini Principal Investigator Associate Professor Daniel Hikuroa demonstrated the power of new perspectives with an evening walk through Ruakurī Caves. The group then spent the night in Marutehiakina, and travelled on to the annual hui the next morning, enriched by the experience and more closely connected to our kaumātua and his community.



Vision and leadership for just transitions

In July 2023 Motu released a guide to help communities and organisations run their own just transition processes in response to challenges like climate change, rapid technological change, employment changes in regions and the transition to renewable energy, in a way that fairly shares both the positive and negative effects.

These are called just transitions. Just transitions are a powerful invitation for communities to develop positive visions for change, transform unfair systems, draw on diverse strengths and worldviews, and come together to solve problems in ways that work better for everyone.

Building upon widespread efforts already underway in Aotearoa, the guide offers practical ideas, methods, tools and case studies so communities can lead processes of change when facing environmental or social disruptions.

Te Pūnaha Matatini investigators were central to creating the guide. Professor Troy Baisden co-led the project, Associate Professor Krushil Watene and Dr David Hall were co-authors, and Jonathan Burgess was responsible for bring together the voices and ideas of the 17 co-authors into an engaging and accessible text in a consistent tone of voice.

The guide draws on tikanga and mātauranga Māori. It includes brief case studies of transitions led by iwi, hapū and Māori communities as well as others.

This work was commissioned by the Ministry of Business, Innovation and Employment and developed by a team of over 25 contributors led by Motu – a Te Pūnaha Matatini partner organisation. The team tested the structure and content in the guide with members of different communities from around Aotearoa in dialogues co-funded by the Aotearoa Foundation through Motu's programme Shaping New Zealand's Low-Emission Future.

<https://www.motu.nz/our-research/environment-and-resources/just-transitions/>



Digital twins in Halcombe

A digital twin is a virtual representation of a product, system or process. Digital twins allow manufacturers to optimise their production processes, hospitals to complete more surgeries, and commuters to find the best way home during rush hour.

In Aotearoa New Zealand, the digital twins approach is now making an autonomous shuttle between Marton and Feilding possible for Ngā Iwi o Te Reureu.

Graeme Everton, the project manager for Māori economic development agency Reureu Kotahitanga Ltd, who passed away in early 2024, wanted to improve connectivity for Ngā Iwi o Te Reureu. Graeme approached Atawhai Tibble from Te Pūnaha Matatini's advisory board about using digital twins to develop and validate his plan for an autonomous shuttle running on rail tracks between Marton and Feilding.

Associate Professor Mike O'Sullivan, deputy director of Te Pūnaha Matatini, has worked with digital twins in healthcare. He brought Dr Yang Zou from the University of Auckland on board to use light detection and ranging (LiDAR) to scan the rail track and convert it into a 3D model. In partnership with Ryan Curry from KiwiRail and Gordon Lyall from iLinks, Graeme and Yang successfully captured the first six kilometres of rail track between Te Reureu Valley and Halcombe.

The next step is to add a realistic model of an autonomous rail shuttle to the digital twin and implement a control system for how the shuttle would operate in practice. Once the digital twin of the track between Te Reureu and Halcombe has been validated and de-risked, a second capture will be done between Marton and Feilding.

This combined data will provide a digital twin to test and showcase a fully autonomous rail service on the network. This digital twin can be used to support the business case for the real-world infrastructure necessary to have an autonomous rail service running between Marton and Feilding by 2027.

The approach pioneered by Graeme, Yang and the rest of the team can also be extended across Aotearoa New Zealand's entire rail system to provide a digital twin for evaluation, management and innovation into the future.



How can we ensure landscape-scale ecological restoration outcomes over time?

After his recent fieldwork, Henry Morse had almost 9,000 photos of plants on his phone.

Henry has been collecting data on how ecological restoration sites have been regenerating over time, to contribute to his PhD in landscape ecology and ecological restoration. He recently received seed funding from Te Pūnaha Matatini to employ two research assistants to assist with his fieldwork.

Ecological restoration aims to recreate, initiate or accelerate the recovery of an ecosystem that has been disturbed. The sites that Henry has been researching are diverse. They are of different ages, different sizes and different locations. Some are surrounded by urban landscapes, some by suburbs, and others by farmland.

Along with his research assistants Paul Bell-Butler and Faustine Cabanne, Henry completed vegetation surveys at sites across the lower North Island of Aotearoa New Zealand, using transects. Transects are straight lines that cut through a landscape so that standardised measurements can be made, tracked over time, and compared to other areas. This will give him a full census of the seedlings, saplings and older trees at each site, and allow him to assess whether regeneration is processing well or being stunted.

Each site took around a day to survey, and half a day afterwards to process all the data — logging huge numbers of plant identifications and measurements, and turning those thousands of photos into usable data.

At the moment, ecological restoration in Aotearoa is largely driven by motivated individuals. “There are a lot of individual landholders that are interested in ecological restoration,” says Henry. “Some have land that is too steep for crops, or so boggy that they lose stock in it. Restoring degrading hillslopes can

prevent further loss of that area, and restoring a bit of wetland on a farm can save the cost of having to pay for losing stock each year.”

“Other people simply have a passion for restoration.”

For ecological restoration to have real benefit, it needs to move beyond these farm-scale projects run by individuals to broader landscape-scale projects. Henry’s overall PhD project is looking at what species to plant, where to plant, and why to plant for landscape-scale restoration. In the first chapter of his thesis, he looks at species distribution models under climate change futures, to get an idea if what we’re planting in restoration projects makes sense for the long term.

The data from this fieldwork will inform the second chapter on how restoration sites are recovering, based on their place in the landscape. “Regeneration sites within a certain proximity of a seed source might show good diversity and abundance,” explains Henry. “So they might need less effort than another site.”

This analysis will be used to strategise restoration on a landscape-scale. Planting is labour-intensive and expensive, so this research will be useful to prioritise where to plant, and what can be left to regenerate on its own. “Natural regeneration is probably going to be the primary powerhouse behind getting regeneration going on the landscape scale,” says Henry.

In the final chapter of his thesis, Henry will explore different landscape-scale restoration scenarios. “If we were to restore five metres alongside every major waterway, what would the impact on the ecosystem be?” asks Henry.

Henry is originally from Los Angeles. Once he has completed his PhD, he wants to continue working in the Aotearoa research system. “The ecological research that’s happening here is amazing,” he says.

“The cutting edge of where ecology is going now is being led by mātauranga Māori. Even though it’s not what I’m working on, just being in the proximity of that feels awesome.”

And if there is a restoration site or group near you, Henry encourages you to get involved. “They can really use the support, and it does so much for your mental health.”

“Or just simply walk off the trail,” says Henry. “Wander around a little bit and get a feel for your local ngahere. It’s awesome.”





Internships support a new generation of researchers

A summer internship can be a lonely experience. That wasn't the case for the 12 interns supported by Te Pūnaha Matatini over the 2023-24 summer.

As they worked on their diverse research projects in complex systems, the interns also came together to build whanaungatanga, experience the pioneering transdisciplinary approach of Te Pūnaha Matatini, and share their work with each other, supported by Te Pūnaha Matatini Deputy Director Associate Professor Michael O'Sullivan.

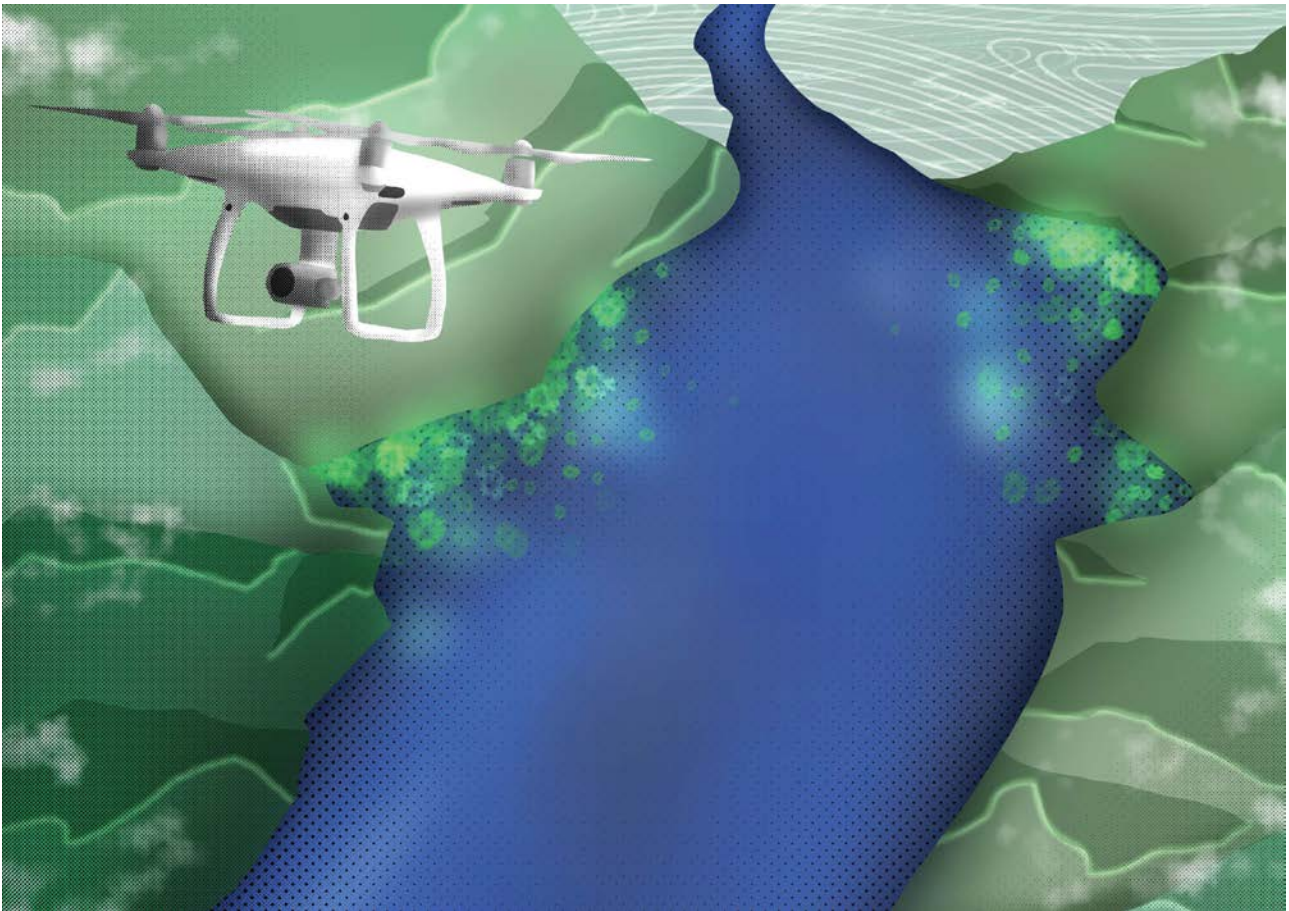
At Te Pūnaha Matatini we are growing and supporting a new generation of researchers who are ethical, collaborative, and do work that matters for Aotearoa New Zealand. This summer, our interns worked on projects ranging from the relationship between mātauranga Māori and science, how Pacific people perceive science in Aotearoa, enhancing an early warning system in a coronary care unit and improving virtual reality displays of a flood model, through to mathematically modelling lake health and investigating intergenerational language acquisition and transmission of te reo Māori.

"It gives us immense joy to see these interns coming through with all their skills and energy," says Te Pūnaha Matatini Co-Director Associate Professor Priscilla Wehi. "It's such a pleasure to interact and learn from them, and hopefully they will have learned something along the way as well."

Te Pūnaha Matatini is the Aotearoa New Zealand Centre of Research Excellence for Complex Systems, with researchers and students based across the country. We coordinate an internship scheme for partner organisations including iwi, ministries, government departments, and private companies.

Mike explains that "we want to give our interns a small community to feel like they're a part of over summer, because sometimes internships can be lonely. It's really exciting to see such talented researchers coming through our education system, and the diverse topics that they are all contributing to."

If you are from an organisation that is interested in collaborating with us on future internships, get in touch at tepunahamatatini@auckland.ac.nz



Above: Rendering of multispectral drone being used to capture data at Te Roto o Wairewa. Illustration by Emilie Gibson.

Te Pūnaha Matatini summer interns 2023–24

- Tavake Tohi (Tonga) | Complex system of Te Roto o Wairewa
- Madeleine Barber-Wilson (Ngāti Kahungunu ki te Wairoa, Ngāti Ruapani mai Waikaremoana) | Complex system of Te Roto o Wairewa
- Zainab Rizvi | Enhancing early warning system in a coronary care unit
- Halavaka Chapman (Niue) | Trust in science
- Tiana Marshall | Kaitiakitanga and the ecodynamics of early Māori horticulture
- Jaiya Bharti | Kaitiakitanga and the ecodynamics of early Māori horticulture
- Liam Gibson | Intergenerational language acquisition and transmission
- Jordan Phillips (Whaingaroa, Matangirau) | Relationship between science and matāuranga
- Arwyn Whaanga (Ngāti Mutunga, Ngāti Kahungunu me Ngāti Rongomaiwahine) | Relationship between science and matāuranga
- Jared Clarke | Virtual reality displays of a flood model
- Mahin Panchia | Enhancing practical conceptual modelling tools
- Jinglong Zhu | Collecting and editing survey data



Learning to effectively engage with policymakers

In October 2023, Te Pūnaha Matatini held a wānanga to develop our capacity to engage with policymakers about our research.

The workshop was led by Te Pūnaha Matatini Principal Investigators Dr Shaun Hendy, Associate Professor Rhian Salmon and Jo Bailey, and Communications and Marketing Senior Adviser Jonathan Burgess.

18 Te Pūnaha Matatini principal investigators and TPM Whānau participated in the wānanga. Over three days, they explored the relationship between research and policy, gained insights into effective communication of research for policy, and learned strategies for supporting evidence-informed decision-making.

Shaun shared his knowledge of the theoretical underpinnings of research-policy engagement, how research and policy operates in Aotearoa New Zealand, case studies of important examples of research-policy interaction in Aotearoa and internationally, and his immense personal experience in engaging with policymakers.

He analysed how research and policy had interacted about issues such as methamphetamine residue in Housing New Zealand homes, the Fukushima nuclear accident, the botulism scare in milk powder, 90-day employment trials, and the Covid-19 response in Aotearoa.

The workshop was enlivened by the hands-on activities created by Jo, in which participants built their dream policy tool out of cardboard, and collaborated to build a paper network of policy relationships sourced from the participants in the room.

Jonathan took all the participants through a guided exercise to draft a policy brief based on issues identified by their research. An expert panel of Dr Christina Hood, Philippa Yasbek and Dr Sarah-Jane O'Connor visited the wānanga to share their extensive experience of working with research and policy.



TPM Whānau member Angela Davies is undertaking doctoral research on education institution data as a source of sustainable competitive advantage. She particularly appreciated the group size, which meant that “each of our needs have been identified and addressed along the way”.

Te Pūnaha Matatini Principal Investigator Dr Céline Cattoën-Gilbert works as a hydrological forecasting scientist at NIWA. She found the atmosphere of trust at the wānanga “refreshing and empowering” and enjoyed the balance of presentations, practical activities, discussion and rest.

Alongside their draft policy briefs, all participants left the workshop equipped with a next action to take to improve their engagement with policymakers. The collective experience over the three days of the wānanga also created a support network for all the participants to draw on as they engage with policymakers about their research.

Research outputs

3 Books

13 Book chapters

159 Journal articles

13 Pre-prints

12 Reports

57 Conference papers

5 Keynote & plenary talks

11 Presentations

4 Published conference proceedings

1 Conference chaired

5 Posters & visual presentations

**5 Workshops, round tables
& presentations**

3 Policy briefings

1 Storymap

1 Position paper

1 Guide

Research highlights

Doehring, Katharina, Cathy Cole, Roger G. Young, and Nancy Longnecker. "Collective Storytelling as a River Restoration Tool: The Role of Catchment Communities in Inspiring Environmental Change." *Frontiers in Communication* 7, (January 13, 2023). <https://doi.org/10.3389/fcomm.2022.1061634>

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<https://www.zotero.org/groups/4719845/tpmgrouplibrary/library>





Awards, grants and public engagement

Two Te Pūnaha Matatini investigators win Prime Minister's Science Prizes

Two Te Pūnaha Matatini principal investigators were recognised in the 2022 Prime Minister's Science Prizes, announced at an event in Te Whanganui-a-tara Wellington on Monday 1 May 2023.

Associate Professor Dianne Sika-Paotonu won Te Puiaki Whakapā Pūtaiao the Science Communication Prize, and Associate Professor Jonathan Tonkin won Te Puiaki Kaipūtaiao Maea the MacDiarmid Emerging Scientist Prize.

Dianne and Jono both represent the new sort of scientist that Te Pūnaha Matatini trains for the benefit of Aotearoa New Zealand, skilled in working with complexity and communicating the results in a clear, helpful, and timely way.

Dianne received the communication prize for her evidence-based science communication. She has been a leading voice during the Covid-19 pandemic, explaining the technical aspects of immunology, vaccines, the SARS-CoV-2 virus and infectious diseases, giving more than 220 broadcast media interviews, and contributing to more than 1,500 online and print media stories.

Dianne joined Te Pūnaha Matatini's community as part of our intake of 35 new principal investigators in March 2023. "We are deeply privileged to have Dianne on board," says Director Cilla Wehi. "She is an accomplished scientist who works closely with communities. Her work is timely and respectful, and helps communities that are frequently under-served to make sense of challenging data."

Jono received his award for his work to turn ecology into a more predictive science. Ecosystems are notoriously hard to predict because of all the moving parts, and his team seeks to find new ways to overcome the challenges associated with the natural complexity of ecosystems.

"Jono is a longstanding Te Pūnaha Matatini principal investigator and leads one of our core research projects," says Cilla. "His locally-responsive work applies world-leading methods to develop radically new approaches that will help protect our rivers and lakes for the future."

As river ecosystems continue to degrade under pressures of increasing human demand and global change, sustaining them is imperative. "It's fundamentally important to do what we can to mitigate the risks that ecosystems face," says Jono. "Because naturally functioning ecosystems provide us with clean water for drinking, food, medicine and so on."

For Jono, this work is personal. He was initially inspired to study ecology through his love of spending time in rivers when growing up. "I'm thrilled that the mahi of these two excellent researchers has been recognised with these prizes," says Cilla. "He mihi nui ki a kōrua. Huge congratulations on behalf of the whole Te Pūnaha Matatini community."



Top: Te Pūnaha Matatini Principal Investigator Associate Professor Dianne Sika-Paotonu won Te Puiaki Whakapā Pūtaiao the Prime Minister's Science Communication Prize.

Above: Te Pūnaha Matatini Principal Investigator Associate Professor Jonathan Tonkin won Te Puiaki Kaipūtaiao Maea the MacDiarmid Emerging Scientist Prize.

Looking to the ice for our future



Te Pūnaha Matatini Principal Investigator Professor Nicholas Golledge was awarded the Hutton Medal 2023 for his cutting-edge contributions to modelling of the Antarctic ice sheet, and research on climate change, including his role as a Lead Author for the most recent Assessment Report from the Intergovernmental Panel on Climate Change (IPCC).

Through establishing capability in observational and theoretical approaches to Antarctic ice-sheet modelling for New Zealand, Nick has become a world leader in his field.

He has significantly advanced knowledge of the ice-sheet's response to climate change and the impacts of melting ice on global sea-level, ocean circulation, and climate variability.

Nick's research has received international recognition and media coverage, and has informed government policies. As well as being a lead author on the IPCC's Sixth Assessment Report on Climate Change, Nick leads initiatives of New Zealand's Antarctic Science Platform which aim to project how changes in Antarctica's ice sheets will cause sea-level rises that will affect our coastlines. His research on "Melting Ice and Rising Seas" aims to reduce uncertainty for communities around Aotearoa New Zealand by predicting the timing and magnitude of increases in sea level. These should help us to develop strategies to mitigate the risks of some of the effects of climate change which are now assessed to be unavoidable.

Nick's research and expertise in the environmental and climate-change field has been widely read and valued by Aotearoa's policy makers and advisors.

Awards

Cameron Walker

Research Impact Award, University of Auckland

Cate Macinnis-Ng

Miriam Dell Award for Excellence in Scientific Mentoring,
Association for Women in the Sciences

Céline Cattoën-Gilbert

Research Excellence Award winner, NIWA

Excellence Team Award runner-up, NIWA

Science New Zealand Team Awards Cyclone risk and response team, NIWA

Daniel Hikuroa

Ō Tātou Matapono Teaching Excellence Award, Faculty of Arts,
University of Auckland

Research Excellence Medal, University of Auckland

David Hayman

Individual Research Medal, Massey University

Dianne Sika-Paotonu

Te Puiaki Whakapā Pūtaiao the Prime Minister's Science Communication
Prize, Royal Society Te Apārangi

Liley Medal – Team Award, Health Research Council and
Royal Society Te Apārangi

Emma Sharp

Contribution to Equity Award, School of Environment, University of Auckland
Rutherford Discovery Fellowship, Royal Society of New Zealand

Holly Thorpe

Distinguished Scholar Award, Centre for Sociocultural Sport
and Olympic Research

Outstanding Book Honourable Mention, North American Society
for the Sociology of Sport

Jesse Whitehead

Best Paper, New Zealand Geographer

Jodie Hunter

Janet Duffin Award, British Society of Research in Learning Mathematics
Team Research Award, Massey University

Jonathan Tonkin

Te Puiaki Kaipūtaiao Maea the MacDiarmid Emerging Scientist Prize,
Royal Society Te Apārangi

Mckayla Holloway

Excellence in Science Communication Award, Science Communicators
Association of New Zealand

Michael Plank

New Zealand Mathematical Society Research Award

Nicholas Golledge

Hutton Medal, Royal Society Te Apārangi

Nirmal Nair

Innovation in Energy Award, New Zealand Energy Excellence Awards

Priscilla Wehi

Visiting Fellow, McDonald Institute, University of Cambridge, England

Rachelle Binny

NZ Mathematical Society Early Career Award

Sereana Naepi

Auckland Research Impact Award, University of Auckland
Early Career Teaching Award, University of Auckland

Simon Stewart

Early Career Researcher Award, New Zealand Freshwater
Sciences Society

Siouxsie Wiles

Yellow Rose Award for advocacy for women in science, Zonta

Grants

Te Pūnaha Matatini investigators are involved with projects which were awarded more than \$81 million in funding in 2023.

Aisling Rayne

Live or let die? Hybrids and the future of conservation in the Anthropocene, Marsden Fund, \$360,000

Alex Macmillan

International curriculum development for a Planetary Health workforce, University of Otago International Programme Innovation Grants, \$10,000

Anna Brown

Ngā Ngaru Wakapuke – Building resilience to future earthquake sequences, Endeavour Fund (Ministry of Business, Innovation and Employment), \$12,670,370
Te Rōpū Mana Toi impact report/case study, Creative New Zealand, \$32,000

Anna Santure

Genomics Aotearoa high quality genomes and population genomics II project, Ministry of Business, Innovation and Employment, \$1,873,591

Hihi hatching failure, Birds New Zealand (Ornithological Society of New Zealand), \$8,302

Fast-tracking finfish climate change adaptation, Endeavour Fund (Ministry of Business, Innovation and Employment), \$10,995,156

Cate Macinnis-Ng

Investigating the consequences of heteroblasty under future climates in New Zealand forests, University of Auckland Faculty of Science, \$40,000

Céline Cattoën-Gilbert

Better runoff and hazard predictions through national-scale snowmelt forecasting, 2023 Endeavour Fund – Smart Ideas (Ministry of Business, Innovation and Employment), \$999,999

Daniel Hikuroa

Braiding Indigenous knowledges and science, National Science Foundation Centre

Archipelagoes Collective, Canadian Institutes of Health Research, \$2,800,000

Emma Sharp

Soilsafe Kids, MBIE Unlocking Curious Minds, \$150,000

Aotearoa New Zealand's diverse soil values: Examining the ontological politics of soil 'management' from the ground up, Rutherford Discovery Fellowships, Royal Society Te Apārangi, \$800,000

Grace Villamor

Next generation silvopastoral system, Sustainable Land Management and Climate Change, Ministry of Primary Industries, \$1,300,000

Graham Donovan

Spatial tipping points, early warning signals and lung physiology: when can we predict catastrophic change? Marsden Fund, \$707,000

Hitaua Arahanga-Doyle

Positive long-term outcomes of adventure education programmes, University of Otago Te Poutama Māori Advancing Research Collaboration Grant Fund, \$14,200

Isabel Castro

Kiwi whakapapa project: improving kiwi population success through genetically informed tomo, Te Pūnaha Hihiko Vision Mātauranga Capability Fund (Ministry of Business, Innovation and Employment), \$250,000

Jesse Whitehead

Exploring seasonal and geographic variation in rural hospital use and bypass behaviour, Waikato Medical Research Fund, \$29,900

Developing equitable and resilient health systems that can respond to three key challenges: Growing demand for healthcare; climate change; and demographic change - a Japanese and New Zealand comparison and co-creation, Royal Society Te Apārangi, New Zealand and Japan Joint Research Projects, \$59,996

Whakatōmuri, whakamua: Walking backwards into the future of Māori cancer care, Health Research Council, \$4,999,831

Understanding the impact of rurality on health outcomes and healthcare delivery, Health Research Council, \$1,199,916.05

Evaluating a bedside high-sensitivity troponin within a rural chest pain pathway, Health Research Council, \$1,199,642.01

Addressing accessibility: Developing a proof-of-concept database to rapidly assess dwelling-level accessibility to health and social services in Aotearoa New Zealand, Waikato University Strategic Research Fund, \$35,486

Libby Liggins

Inkfish Coastal Seas research programme (Philanthropic funding), \$2,600,000

Molecular library of groundwater fauna, Ministry for the Environment, \$357,000

Lisa Pilkington

Development of new lipophilic Bcl-2 inhibitors for pediatric glioblastoma multiforme Treatment, Maurice and Phyllis Paykel Trust, \$10,000

Shedding light on the present and the past; a novel environmental/ancient DNA capture system, Marsden Fund, \$944,000

Michael Plank

Likely future pandemic agents and scenarios: An epidemiological and public health framework, Te Niwha Infectious Diseases Research Platform

Murray Cox

What are the key predictors of invasion success? Marsden Fund, \$942,000

Nirmal Nair

Huritanga: Towards towards socio-ecological wellbeing-led urban systems in an era of emergency, Building Better Homes, Towns and Cities National Science Challenge, \$105,482

Built Environments Program, National Science Challenge – Resilience to Nature's Challenges National Science Challenge, \$4,250,000

Harnessing disruptive technologies for seismic resilience (2021–28), QuakeCore, \$1,330,000

Architecture of the future low-carbon, resilient, electrical power system, Strategic Science Investment Fund-Advanced Energy Technology Platform (MBIE), \$13,297,322

Horizon Energy – REsHorizon Network, \$162,189

Pierre Roudier

Proximal sensing for near real-time monitoring of soil organic carbon pools for climate smart management, NZ-Ireland joint research call, \$1,315,000

Scoping the best strategy for updating the soil information of the Marlborough Sounds, Envirolink, \$10,000

Rebecca Phillipps

Tahanga to Toki, University of Auckland, \$25,000

Sereana Naepi

Liberating migrant labour?: International mobility programmes in settler-colonial contexts, Canadian Social Sciences Humanities Research Council Partnership Grant, \$3,087,506.62

Mapping food for Pacific communities: Navigating the vā of food systems and food security for Pacific people, University of Auckland Transdisciplinary Research Funding, \$59,847

Simon Stewart, Mckayla Holloway

Our lakes our future: Holistic approaches to transform lake management and restoration in a changing world, MBIE, \$11,495,805

Tammy Steeves

Gene flow to the rescue? An analytical framework for estimating impacts of genetic augmentation on wildlife population dynamics, Marsden Fund, \$1,000,000

Growing relationships on Rēkohu | Wharekauri | Chatham Islands, Vision Mātauranga Development Fund (University of Canterbury), \$10,000

Zac McIvor

Wellbeing and archaeological practice in response to climate change, University of Otago Research Grant, \$30,105

Zac McIvor, Hitaua Arahanga-Doyle

VR, heritage, wellbeing, University of Otago Psychology Department Additional Strategic Fund, \$7,600



Above: Dr Chrissie Painting and a student from Kaingaroa School learning about bugs.

Public engagement

Public engagement is central to the kaupapa of Te Pūnaha Matatini. Alongside a considerable volume of peer-reviewed publications, our investigators work hard to communicate their research to diverse audiences.

The release of Professor Rebecca Priestley's book *End Times* was a highlight of 2023. This work of creative non-fiction explores the anxiety of the contemporary climate crisis alongside fears of nuclear annihilation in the 1980s through a memoir of a road trip down Te Wai Pounamu.

Professor Tammy Steeves and Dr Chrissie Painting travelled to the Chatham Islands to facilitate connections between communities, between people and endemic fauna and between species.

Dr Zac McIvor has been busy making archaeology accessible to all through public talks, and his new blog *The Past Before Us*.

The Tales of Diversity project continues to be active in exploring narratives of Māori and Pacific success in science, technology, engineering and mathematics through discussion and virtual reality in schools around Tāmaki Makaurau.

Te Pūnaha Matatini Deputy Director Associate Professor Michael O'Sullivan and Principal Investigators Dr Céline Cattoën-Gilbert, Professor Holly Thorpe and Professor Anna Brown were very active throughout the year engaging with communities in Te Tai Rāwhiti to address the issues that they face in the ongoing aftermath of Cyclone Gabrielle.

A series of principal investigators also honed their storytelling skills through the blog series on our website. They were paired with an editor and illustrator to share one key aspect of their research through story.

Alongside these creative efforts, Te Pūnaha Matatini investigators continue to be sought-after, respected experts speaking to wide audiences about their research.

Media highlights

Ending the ‘postcode lottery’ in health is more than a technical fix – it means fundamentally reorganising our systems, The Conversation, featuring Associate Professor Anna Matheson

<https://theconversation.com/ending-the-postcode-lottery-in-health-is-more-than-a-technical-fix-it-means-fundamentally-reorganising-our-systems-202336>

We could forecast floods better. Why don’t we? New Zealand Geographic, featuring Dr Céline Cattoën-Gilbert

<https://www.nzgeo.com/stories/we-could-forecast-floods-better-why-dont-we/>

Why intergenerational thinking is essential to heal the planet, YES!, featuring Associate Professor Daniel Hikuroa

<https://www.yesmagazine.org/environment/2023/04/04/climate-change-intergenerational-thinking>

Why is Antarctic sea ice vanishing? Radio New Zealand, featuring Associate Professor Inga Smith

<https://www.rnz.co.nz/programmes/the-detail/story/2018884956/why-is-antarctic-sea-ice-vanishing>

The data drought affecting water reforms, Newsroom, featuring Dr Julia Talbot-Jones

<https://newsroom.co.nz/2023/11/10/the-data-drought-affecting-water-reforms/>

Clue to rising sea levels lies in DNA of 4m-year-old octopus, scientists say, The Guardian, featuring Professor Nicholas Golledge

<https://www.theguardian.com/world/2023/feb/05/clue-to-rising-sea-levels-lies-in-dna-of-4m-year-old-octopus-scientists-say>

Te reo Māori can still avoid ‘path to extinction’, new research suggests, The Post, featuring Michael Miller, Associate Professor Rachael Ka’ai Mahuta, Professor Michael Plank and Associate Professor Priscilla Wehi

<https://www.thepost.co.nz/te-ao-maori/350070409/te-reo-maori-can-still-avoid-path-extinction-new-research-suggests>

New Zealand’s tribunals are a model for Canadian reconciliation, The McGill International Review, featuring Professor Tom Roa

<https://www.mironline.ca/new-zealands-tribunals-are-a-model-for-canadian-reconciliation/>

Governance and management

Advisory Board

Richard Aitken (Chair)

Consulting engineer (retired)

Professor Jim Metson (until March 2023)

Waipapa Taumata Rau University of Auckland

Professor Frank Bloomfield (from March 2023)

Waipapa Taumata Rau University of Auckland

Keoni Mahelona (from October 2023)

Te Hiku Media

Pieta Brown

Deloitte

Professor Wendy Lawson

Te Wānanga Aronui o Tāmaki Makau Rau AUT

Atawhai Tibble

Social Investment Agency

Professor John Hosking

Waipapa Taumata Rau University of Auckland

Strategic Leadership Group

Professor Tom Roa

Kaumātua, Te Whare Wānanga o Waikato University of Waikato

Associate Professor Priscilla Wehi

Director, Te Whare Wānanga o Ōtākou University of Otago

Associate Professor Michael O'Sullivan

Deputy Director, Waipapa Taumata Rau University of Auckland

Associate Professor Ilze Ziedins

Complexity Community of Inquiry Lead (until June 2023)
Waipapa Taumata Rau University of Auckland

Associate Professor Matthew Parry

Complexity Community of Inquiry Lead (from July 2023)
Te Whare Wānanga o Ōtākou University of Otago

Associate Professor Krushil Watene

Culture of Research Excellence Community of Inquiry Lead (until June 2023)
Waipapa Taumata Rau University of Auckland

Professor Tammy Steeves

Culture of Research Excellence Community of Inquiry Lead (from July 2023)
Te Whare Wānanga o Waitaha University of Canterbury

Associate Professor Rhian Salmon

Engagement Community of Inquiry Co-Lead
Te Herenga Waka Victoria University of Wellington

Mckayla Holloway

Engagement Community of Inquiry Co-Lead, Cawthron Institute

Associate Professor Anna Matheson

Project Leader Representative, Te Herenga Waka Victoria University of Wellington

Professor David Hayman

Investigator Representative, Te Kunenga ki Pūrehuroa Massey University

Kathryn Morgan

Research Operations Manager, Waipapa Taumata Rau University of Auckland

Dr Aisling Rayne

Chair, TPM Whānau, Cawthron Institute

Financial report 2023

Funding summary for the period ending 31 December 2023

| | Actuals |
|-------------------------------------|--------------|
| | \$000 |
| Funding received | |
| Tertiary Education Commission grant | 4,000 |
| Surplus carried forward | 3,016 |
| Total funding received | 7,016 |
| Expenditure | |
| Salaries funded by CoRE | 1,390 |
| Other costs | |
| Overheads | 1,225 |
| Project costs | 224 |
| Travel | 296 |
| Postgraduate students | 570 |
| Extra-ordinary expenditure | 0 |
| Total other costs | 2,315 |
| Total expenditure | 3,705 |
| Net surplus/(deficit) | 3,311 |

Notes

This report covers the period from 1 January to 31 December 2023 and details funding received and funds distributed to collaborative partners of Te Pūnaha Matatini.

All amounts are shown exclusive of Goods and Service Tax (GST).

The net surplus will be carried forward into 2024 to fund future expenditure of the CoRE and also those projects and postgraduate students that have had delays to their start dates.

Table of statistics

| Broad category | Detailed category | Yr1 | Yr2 | Yr3 |
|---|--------------------------|-------------|--------------|--------------|
| Value of CoRE Funding from TEC (\$M) | | 2 | 4 | 4 |
| FTEs | Principal investigators | 1.8 | 4.68 | 6.05 |
| by category | Postdoctoral fellows | 0 | 0.66 | 2.93 |
| | Administrative/support | 1.62 | 2.78 | 3.03 |
| | Research students | | 4.44 | 13.85 |
| | Total | 3.42 | 12.56 | 25.86 |
| Headcounts | Principal investigators | 78 | 77 | 100 |
| by category | Postdoctoral fellows | 8 | 19 | 16 |
| | Research technicians | 1 | 0 | 0 |
| | Administrative/support | 5 | 5 | 5 |
| | Other | 4 | 1 | 11 |
| | Research students | 63 | 102 | 120 |
| | Total | 159 | 204 | 252 |
| Peer-reviewed research outputs by type | Books | 0 | 1 | 3 |
| | Book chapters | 7 | 8 | 13 |
| | Journal articles | 85 | 87 | 159 |
| | Conference papers | 7 | 8 | 4 |
| | Prizes and distinctions* | | | |
| | Other (PBRF category) | 43 | 32 | 34 |
| | Total | 141 | 136 | 213 |
| Commercial activities | Spinouts (cumulative) | 4 | 4 | 4 |
| | Total | 4 | 4 | 4 |
| Students studying at CoRE by level | Doctoral degree | 40 | 56 | 72 |
| | Masters degree | 10 | 21 | 19 |
| | Other | 13 | 25 | 29 |
| | Total | 63 | 102 | 120 |

* Reported on page 60

Our people

100 Principal Investigators

125 TPM Whānau

4 HQ Team

1 Kaumātua



Above: New Principal Investigator Mairéad de Róiste introduces herself at the annual hui.

35 new investigators for Te Pūnaha Matatini

In March 2023, Te Pūnaha Matatini welcomed 35 new principal investigators to its community.

Kaumātua Professor Tom Roa extended “a very warm and hearty welcome to the potential in this group of researchers who have won places amongst Te Pūnaha Matatini’s very dedicated team.”

These new principal investigators will be able to participate in Te Pūnaha Matatini’s research programmes, meetings and workshops, apply for funding, have a say in how we evolve, and contribute to meeting the strategic objectives of the CoRE. They will also be able to supervise Te Pūnaha Matatini PhD students, and bring their other PhD students and post-doctoral fellows into our emerging scientist network, TPM Whānau.

“Te Pūnaha Matatini’s world is opening up with the arrival of these new investigators,” says Director Associate Professor Cilla Wehi. “They’re bringing fresh ideas and they’re bringing new passion. It’s going to be really exciting to see what we can do together.”

“Every conversation I have with one of our new investigators gets me inspired.”

New Te Pūnaha Matatini investigators

- Associate Professor David Aguirre (Ngāti Kahungunu, Te Whānau-ā-Apanui, Ngāti Tuwharetoa), Te Kunenga ki Pūrehuroa Massey University
- Dr Hitaua Arahanga-Doyle (Ngāi Tahu, Te Ati Haunui-a-Pāpārangi), Te Whare Wānanga o Ōtākou University of Otago
- Dr Peter Russell (Ngāpuhi), Te Whare Wānanga o Ōtākou University of Otago
- Dr Kelly Blincoe, Waipapa Taumata Rau University of Auckland
- Dr Céline Cattoën-Gilbert, NIWA

- Justin Connolly (Waikato-Tainui), Deliberate
- Dr Mairéad de Róiste, Te Herenga Waka Victoria University of Wellington
- Associate Professor Graham Donovan, Waipapa Taumata Rau University of Auckland
- Dr Tom Etherington, Manaaki Whenua Landcare Research
- Dr Peni Fukofuka, Te Whare Wānanga o Waitaha University of Canterbury
- Dr Gillian Gibb (Ngāti Mutunga), Te Kunenga ki Pūrehuroa Massey University
- Professor Nick Golledge, Te Herenga Waka Victoria University of Wellington
- Dr Gina Grimshaw, Te Herenga Waka Victoria University of Wellington
- Dr Kyle Higham, Motu Research
- Mckayla Holloway (Ngāi Tahu), Cawthron Institute
- Professor Jodie Hunter, Te Kunenga ki Pūrehuroa Massey University
- Associate Professor Libby Liggins, Te Kunenga ki Pūrehuroa Massey University
- Dr Catriona MacLeod, Manaaki Whenua Landcare Research
- Associate Professor Alex Macmillan, Te Whare Wānanga o Ōtākou University of Otago
- Dr Zac McIvor (Te Patupō), Te Whare Wānanga o Ōtākou University of Otago
- Dr Sereana Naepi, Waipapa Taumata Rau University of Auckland
- Dr Lisa Pilkington, Waipapa Taumata Rau University of Auckland
- Dr Matt Pinkerton, NIWA
- Associate Professor Anna Santure, Waipapa Taumata Rau University of Auckland
- Associate Professor Dianne Sika-Paotonu, Te Whare Wānanga o Ōtākou University of Otago
- Dr Simon Stewart (Ngāti Kahungunu ki Wairoa), Cawthron Institute
- Associate Professor Daniel Stouffer, Te Whare Wānanga o Waitaha University of Canterbury
- Dr Priya Subramanian, Waipapa Taumata Rau University of Auckland
- Dr Julia Talbot-Jones, Te Herenga Waka Victoria University of Wellington
- Dr Hiran Thabrew, Waipapa Taumata Rau University of Auckland
- Professor Holly Thorpe, Te Whare Wānanga o Waikato University of Waikato
- Te Rerekohu Tuterangiwhiu (Ngapuhi, Ngaruahine, Ngai Te Rangi Waikato), Cawthron Institute
- Professor Rhema Vaithianathan, Te Wānanga Aronui o Tāmaki Makau Rau AUT
- Dr Grace Villamor, Scion
- Dr Jesse Whitehead, Te Whare Wānanga o Waikato University of Waikato

Te Pūnaha Matatini received more than 60 excellent applications in this call for investigators, which meant the Strategic Leadership Group had some exceptionally difficult decision-making to do. They were awed by the breadth of expertise in the applications, and the openness and passion of the applicants.

“I thank all of those who applied, because it really was a privilege to read their applications,” says Cilla. “I would have loved to accept so many more.”

Kaumātua

Associate Professor Tom Roa

Kaumātua

Te Whare Wānanga o Waikato University of Waikato

Executive team

Associate Professor Priscilla Wehi

Director

Te Whare Wānanga o Ōtākou University of Otago

Associate Professor Michael O'Sullivan

Deputy Director

Waipapa Taumata Rau University of Auckland

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Kairangi is a Māori term meaning ‘the finest pounamu’ (greenstone or jade) which can be used to describe a person held in high esteem. This category of investigator reflects our development as an organisation and acknowledges the important contributions of our senior colleagues.

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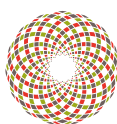
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Front cover: The poutama pattern represents the pathway on which Tane-te-wānanga-ā-rangi ascended in his quest for knowledge. The steps symbolise the various levels of growth, learning and achievement. This is overlaid with a stylised network diagram.

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Complexity is at our heart