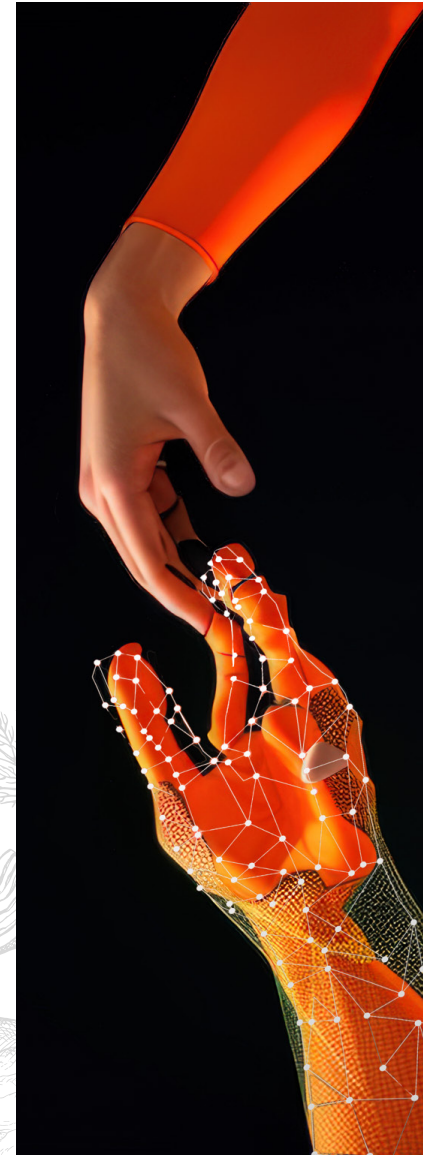## ANNUAL REPORT 2023

Mahi Tahi 5

Office of the Prime Minister's Chief Science Advisor
Kaitohutohu Mātanga Pūtaiao Matua ki te Pirimia

Tohea, tohea, ko te tohe i te kai

Opening remarks

From the Rt Hon Chris Hipkins

The Prime Minister working with local response teams in preparation for Cylone Gabrielle.

This year has clearly been another busy one for Professor Dame Juliet Gerrard, and the wider team of Chief Science Advisors (CSAs), across a broad range of areas.

The work of CSAs is hugely valuable in informing government. It's vitally important we are able to draw on robust scientific and technical information and advice to inform policy and decisions, and this was once again highlighted during the onset of severe North Island weather events. Robust science advice is amongst the critically important information which will enable us to both recover from these recent events and ensure we are more resilient in future.

In other areas, they have continued important work on food waste, a major project in helping understand New Zealand's significant food waste problem. As well as reports on the landscape of food waste and the role food rescue can play, the project has developed web resources about what you can do with your food waste at home, in the community and in industry. It's great to see some practical solutions - I encourage you to check it out on page 21.

Juliet and her team have also recently released an evidence synthesis into adult gangs in New Zealand to shed light on the harm caused by and within gang communities. Much of the existing research literature comes from the US and Europe so it's helpful to have further research about gangs in New Zealand, given the Government's focus on reducing the harm they cause.

I'm also particularly looking forward to seeing the results of work on AI. I specifically asked Juliet to work on this area because of the potentially significant impacts on different areas of our lives. I am particularly interested in the impacts of AI on work, and opportunities in health care, the areas of her initial focus.
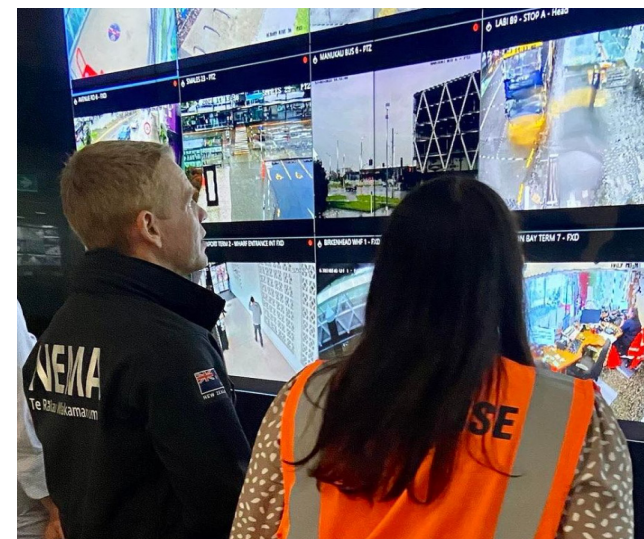
In closing, I would like to reinforce my thanks to the science community, particularly Juliet and her team, for their valued contributions over the past year.

Rt Hon Chris Hipkins

"Robust science advice is amongst the critically important information which will enable us to both recover from these recent events and ensure we are more resilient in future."

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Cover Image: AI generated images of hands. Credit: iStock and Stable Diffusion by Ben Hartshorn.

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of Aotearoa New Zealand's
adult gang environment

A report from the Prime Minister's Chief Science Advisor,
Kaitohutohu Mātanga Pūtaiao Matua ki te Pirimia

Key messages

June 2023

Ka mua, ka muri

Looking back at her fifth year as Kaitohutohu Mātanga Pūtaiao Matua ki te Pirimia, Juliet reflects on the past year of science advice, evidence, communication and conversation.

Tēnā koutou katoa, ngā mihi o te wā ki a tātou.

Ahakoa ngā ārai, ahakoa ngā aupiki me ngā auheke, mā te āta wānanga me te mahi tahi e whai rongoā, e whai rautaki kia anga whakamua ai tātou katoa.

Kei te ao hurihuri tātou e noho nei engari mā te titiro ki ngā rā o mua me ngā kōrero o nehe, kei reira kitea ai he oranga mō tātou.

Nā reira, anei ētahi pitopito kōrero.

As my fifth year in this role draws to a close, it is a relief to have been able to concentrate on a set of projects relatively uninterrupted by a pandemic. We have not been free of disasters, but the science responses have been ably led by two CSAs around our Forum table – Professor Tom Wilson (CSA, Te Rākau Whakamarumaru National Emergency Management Agency) and Dr Chris Daughney (CSA, Te Uru Kahika - Regional and Unitary Councils Aotearoa). You can read more about the response to Cyclone Gabrielle on page 13.

Our team has delivered several projects this year. We began by releasing an explainer on our website about the health impacts of nitrate in drinking water. This is a complex issue with contested views and relies on incomplete and uncertain data. Thanks to all the referees who helped us pull together a consensus view.

Our major project for the year has been on food waste, which we are completing in modules. The first report explored the current state of food waste in Aotearoa and the scope of combatting food waste to deliver environmental, social, and economic benefits. The second report focused on food rescue as an intervention to prevent food insecurity, which was followed by a web resource on dealing with household food waste. You can read more about this ongoing mahi on page 21.

We also delivered an evidence synthesis on understanding the gang environment in Aotearoa, supported by Professor Ian Lambie (CSA, Te Tāhū o te Ture Ministry of Justice) and Professor Tracey McIntosh (CSA, Te Manatū Whakahiato Ora Ministry of Social Development). We did our best to include as broad a perspective as possible to highlight the complexities of the issues in these communities. While there are no quick fixes, it is our hope that the report can support these difficult conversations and provide an evidence base upon which our decision makers can build policies which bring lasting changes for Aotearoa.

> **"Two highlights for the year have been watching our intern and fellowship programme expand again and resuming international travel."**

Professor Michael Bunce
Chief Science Advisor | Te Papa Atawhai Department of Conservation

Dr Gill Jolly
Chief Science Advisor | Hīkina Whakatutuki Ministry of Business, Innovation & Employment

Two highlights for the year have been watching our intern and fellowship programme expand again and resuming international travel. My trip to the US enabled me to meet colleagues at the National Science Foundation and the White House Office of Science and Technology Policy. I also joined the MFAT delegation to the ASEAN-Indo-Pacific Workshop on Marine Plastics Debris at the Regional Capacity Center for Clean Seas, Indonesia to share our earlier work on *Rethinking plastics*. The team travelled to Finland and Estonia to learn about building resilience in our young people amidst polluted information. Read more about our international engagement on page 41.

It has also been a year of goodbyes and hellos. Hema Sridhar left her role as the CSA at Manatū Kaupapa Waonga Ministry of Defence. Gary Evans has finished his term as the CSA for Hīkina Whakatutuki

Ministry of Business, Innovation & Employment, and we welcome Dr Gill Jolly in his place. We were also pleased to welcome back Professor Michael Bunce in his new role as the CSA for Te Papa Atawhai Department of Conservation. And in my team, we farewelled Emily McCarthy and Celia Cunningham, and welcomed Dr Jacques de Satge, Dr Rebecca Benson, and Carolle Varughese.

As we enter my last year in the role, we are busy finishing off our work on resilience in young people to polluted information and food waste. We are also sinking our teeth into the fascinating territory of AI in healthcare, working on a rapid report with an expert panel co-chaired by Professor Ian Town (CSA, Manatū Hauora Ministry of Health). Read more about our work on AI on page 27.

We hope that you enjoy this annual report. Let us

know if you would like us to send you a hard copy.

Ngā manaakitanga,

Juliet

The year in numbers

5
publications

43
talks and presentations

19
media interviews

64
media mentions

13
interns and fellows

21k
followers

5.4k
followers

54k
unique web visitors

The team

Te amorangi ki mua, te hapai o ki muri.

The Prime Minister's Chief Science Advisor advises the Prime Minister on scientific evidence, acts as a conduit between the research community and government, and engages in activities to raise the profile of science in Aotearoa New Zealand. The Office, based at Waipapa Taumata Rau University of Auckland is non-partisan and independent of government, working to create a trusted bridge between science, society and government.

Last year the Office said haere rā to Emily McCarthy and Celia Cunningham and welcomed Dr Jacques de Satge, and Dr Rebecca Benson, and Carolle Varughese to the team.

Read more about the team:

pmcsa.ac.nz/who-we-are/our-office

Professor Dame Juliet Gerrard DNZM FRSNZ HonFRSC started her second term as the Prime Minister's Chief Science Advisor in July 2021. Guided by the principles of rigour, inclusivity, transparency and accessibility, she has continued to convene the cross-agency Chief Science Advisor Forum and deliver a work programme agreed with the PM each year. Juliet is seconded from her role as Professor at Waipapa Taumata Rau University of Auckland.

Jacqui Barclay is Juliet's office manager and EA and keeps the show on the road.

Dr Susie Meade is Juliet's principal advisor. With a PhD in Chemistry, more than 20 years' experience in research and management, a true passion for science, and an eye for detail, Susie is crucial to our mahi. She plays a key role in running the CSA Forum and has become expert at facilitating Zoom meetings during the course of the pandemic. Susie splits her time between Tāmaki Makaurau Auckland, Te Whanganui-a-Tara Wellington, and Ōtautahi Christchurch.

Dr George Slim is a senior advisor. With over 30 years' experience in academia, policy, small business and the public research sector, George is fluent in Academic, Bureaucrat and Commercial, and an able translator between them. This past year has seen George support our interns and keeps us connected to folks in the capital from his base in Te Whanganui-a-Tara Wellington.

Dr Emma Brown (Ngāpuhi, Ngāti Maru, Ngāti Pūkenga, Ngāi Te Rangi) is a senior research and policy analyst. She completed her BE(Hons) at Waipapa Taumata Rau University of Auckland in 2013 and went on to work in the steel industry as a process engineer. Emma returned to the University of Auckland in 2017 to complete a PhD in the Chemical and Materials Engineering department, with a specific focus on biological tissue mechanics. This year Emma has ably led our work on understanding gang harms and has now shifted her focus to the new project on AI in healthcare.

Dr Rebecca Benson is a senior research and policy analyst. Her background is in neuroscience and quantitative social science, and she joined the Office in May 2023 after many years working at the intersection of research and policy at various universities in London. Rebecca completed her PhD in Public Policy at the University of Texas at Austin, and has a Master of Public Health from the Te Whare Wānanga o Otāgo University of Otago. She brings this health perspective to our project on AI in healthcare.

Dr Jacques de Satge is a research analyst and writer. He has a background in environmental sciences, and recently completed his PhD in Conservation Biology at Massey University. Prior to his PhD, Jacques worked and studied in Belgium, Germany, and South Africa, in disciplines spanning ecology, journalism, applied biology, and conservation. Trained in systems-thinking, Jacques is adept at problem solving across multiple scales and contexts. He leads our work on food waste.

Carolle Varughese is a research analyst and writer, and the newest member of the team. Having worked at high schools, universities, and not-for-profit organisations, she blends her public policy, education, and physics expertise as a science communicator and outreach specialist. Carolle completed her Master of Public Policy at Waipapa Taumata Rau University of Auckland, focusing on space policy in Aotearoa. Carolle brings a fresh perspective to our work on supporting youth resilience to polluted information.

Colson Verdonk is a research analyst and writer. Prior to joining the office, Colson worked as an advisor to a Member of Parliament. Colson has an academic background in environmental science, geography, politics and international relations, and social science for public health. In his spare time, Colson is working on a Master of Public Policy at Waipapa Taumata Rau University of Auckland. Colson supported Emily McCarthy in our food waste project earlier in the year and has since lead our work on supporting youth resilience to polluted information.

Chief Science Advisor Forum

He Rauhinga Tohu Pūtaiao. Ehara taku toa i te toa takitahi, engari he toa takitini.

The Prime Minister's Chief Science Advisor convenes a forum of CSAs from across government departments, ministries and agencies. The Forum, which meets around ten times a year, receives additional support from co-opted members and connects widely with the research community to ensure it can provide comprehensive advice and build an extensive range of expert contacts. Subgroups of the Forum also come together periodically to provide specific advice on cross-sector issues.

This year we said haere rā to Professor Gary Evans and Hema Sridhar. In the past year we were pleased to welcome back Professor Michael Bunce in his new role as the CSA for Te Papa Atawhai Department of Conservation. We welcome Dr Gill Jolly as the new Hīkina Whakatutuki Ministry of Business, Innovation and Employment CSA in July 2023.

Above: Professor Michael Bunce and Dr Gill Jolly.

Meet the CSA Forum

Professor Dame Juliet Gerrard DNZM FRSNZ HonFRSC – PMCSA, Kaitohutohu Mātanga Pūtaiao Matua ki te Pirimia

Professor Michael Bunce -   Chief Science Advisor, Te Papa Atawhai Department of Conservation

Dr Alison Collins – Departmental Chief Science Advisor, Manatū Mō Te Taiao Ministry for the Environment

Dr Chris Daughney – Chief Science Advisor, Te Uru Kahika - Regional and Unitary Councils Aotearoa

Vince Galvin – Chief Methodologist, Tatauranga Aotearoa Statistics New Zealand

Erica Gregory (Waikato, Ngāti Maniapoto) – Manahautū, Kaupapa Kura Taiao Environmental Protection Agency

Professor Simon Kingham – Chief Science Advisor, Te Manatū Waka Ministry of Transport

Professor Ian Lambie ONZM – Chief Science Advisor, Tāhū o te Ture Justice Sector

Professor Tracey McIntosh (Ngāi Tūhoe) MNZM – Chief Science Advisor, Te Manatū Whakahiato Ora Ministry of Social Development

Professor Stuart McNaughton ONZM – Chief Education Scientific Advisor, Te Tāhuhu o Te Mātauranga Ministry of Education

Dr Rob Murdoch – Departmental Science Advisor, Hīkina Whakatutuki Ministry of Business, Innovation and Employment

Tim Ng - Strategic Economic Advisor, Te Tai Ōhanga The Treasury

Dr John Roche – Chief Science Advisor, Manatū Ahu Matua Ministry for Primary Industries

Dr Kay Saville-Smith MNZM – Chief Science Advisor, Te Tūāpapa Kura Kāinga Ministry of Housing and Urban Development

Dr Rodney Scott – Chief Policy Advisor and Chief Science Advisor, Te Kawa Mataaho Public Service Commission

Professor Ian Town FRACP – Chief Science Advisor, Manatū Hauora Ministry of Health

Professor Tom Wilson – Chief Science Advisor, Te Rākau Whakamarumaru National Emergency Management Agency

For full bios and more info on the CSA Forum, visit

pmcsa.ac.nz/who-we-are/chief-science-advisor-forum/

Cyclone Gabrielle

The importance of science in the response.

Cyclone Gabrielle was one of the most impactful storms Aotearoa has experienced in the past 50 years. It impacted multiple regions across the North Island, causing very heavy rainfall and severe winds, as well as extensive flooding, landslides and sediment deposition on a scale not experienced since Cyclone Bola in 1988.

A huge number of communities were heavily impacted. Tragically, 11 people lost their lives. Over 10,000 people were displaced from their homes. Essential services to communities were also particularly badly affected, with over 144,000 properties losing electricity, and extensive and (in many cases) prolonged disruption to transportation, telecommunications, and water supply networks.

Affected communities exhibited incredible feats of bravery, support, and stoicism in extremely confronting and challenging circumstances. But as is often tragically the case, this disaster also amplified existing social inequalities and vulnerabilities.

Multiple regions declared states of emergency, culminating in a State of National Emergency (the third ever) being declared for affected regions from 14 February to 14 March 2023. The National Crisis Management Centre – which is housed below ground in the Beehive, was activated throughout the response. This is where Te Rākau Whakamarumaru National Emergency Management Agency (NEMA) CSA Professor Tom Wilson found himself just after the birth of his second child, helping to coordinate science advice and mobilisation of the Aotearoa science system to support the response to the Cyclone.

Tom reflected on his role in the response: *"The mantra for emergency management in Aotearoa is 'locally led, regionally coordinated, and nationally supported'. So we were racing to connect science teams with where their expertise was needed to support evidence-informed decision-making. The scale of the disaster was very challenging, with so many regions affected. But it also came at a time that compounded social and economic impacts. Many of the cyclone affected regions were already recovering from multiple previous storms over the previous months, and the nation was also just emerging from the COVID 19 pandemic,"* said Tom.

The science advice and associated support was incredibly diverse, ranging from weather- and flood-warnings to landslide life-safety assessment, flood sediment clean up advice to psychosocial health advice, and satellite imagery analysis to assessing social and economic impacts.

"We also tried to think ahead to what critical data

needed to be collected to inform recovery and wider resilience operations – a sad reality is that we've had a lot of experience with major disasters in Aotearoa over the past decade or so" said Tom.

A key role the CSAs played was connecting and coordinating researchers from across Crown Research Institutes, universities, government agencies and iwi with the private sector, with emergency managers, and the huge array of organisations and agencies responding to the disaster at local, regional, and national levels. This was – and still is – a huge multi-disciplinary effort spanning across social, physical, natural, and engineering scientists and mātauranga Māori experts.

"It has been humbling to see the amazing expertise and dedication our science community has contributed to supporting the response to this disaster – they are an essential part of the emergency management system," said Tom.

The CSA Forum was an important network for sharing science needs and priorities, capabilities and problem-solving – especially on complex issues.

Dr Chris Daughney (CSA, Te Uru Kahika - Regional and Unitary Councils Aotearoa) provided an essential connection between regional and national level, facilitating regular hui with regional science managers and ensuring the regional sector science priorities were clearly identified and understood at a national level.

"The networks and connections we had before Cyclone Gabrielle were invaluable. They enabled us to get started relatively quickly, to gather science priorities from across affected regions, determine what national level support was needed, and providing connections as the challenges unfolded," said Chris.

Dr Alison Collins (CSA, Manatū Mō Te Taiao Ministry for the Environment), Dr John Roche (CSA at Manatū Ahu Matua Ministry for Primary Industries), Professor Ian Town (CSA, Manatū Hauora Ministry of Health) and Professor Mike Bunce (CSA, Te Papa Atawhai Department of Conservation) also all made considerable contributions to the disaster response across their areas of expertise and agency responsibilities. Emma Coultas also provided amazing support, pausing her post-graduate research studies to take up a secondment to NEMA as Strategic Science Coordinator. This position was funded by the OPMCSA, which also provided considerable support to the response.

A key feature of the science response to this disaster was the Hīkina Whakatutuki Ministry of Business, Innovation and Employment (MBIE) 'North Island Extreme Weather Event' platform, which provided ~$10 million to enable urgent and high-priority science to support the emergency response and recovery. All the CSAs were asked to provide

Image: Selwyn volunteers sorting supplies that had been returned from Auckland Civil Defence Centres so that it could be stored and reused. Image credit: NEMA

"A key feature of the science response to this disaster was the Hīkina Whakatutuki Ministry of Business, Innovation and Employment (MBIE) 'North Island Extreme Weather Event' platform, which provided ~$10 million to enable urgent and high-priority science to support the emergency response and recovery. "

science priorities from their respective agencies and act as 'champions' for projects. Tom, Chris, and Professor David Hutchison (DSA, MBIE) were part of the Expert Advisory Panel, which evolved into a considerable liaison and coordination role.

An 'Extreme Weather Response – Māori Determined Fund' supporting projects to enable Māori communities to access science services and support decision-making has also been established – the first time following a major disaster. Several CSAs have been supporting this, as non-voting members of the advisory panel.

These investments have and will provide essential knowledge to support short and long-term recovery, and wider resilience.

As with all disasters, there are plenty of lessons to learn. Tom reflected *"a notable feature of this disaster was the huge appetite for geospatial data and associated analysis – perhaps exacerbated by the multi-hazard impacts across such a large area of the country. Yet it was challenging to coordinate, fund, and service this within the current system – so this must be a priority to address. This event has also heightened the critical need for multi-hazard risk assessment capability to inform adaptation and migration action, both for dynamic life safety and longer-term land use planning. Tied to this are the challenging questions around what level of risk is tolerable for communities and affordability potential solutions."*

Tom hopes Cyclone Gabrielle will be a line in the sand. *"A key part of preparing for future disasters is to truly learn from this tragic event and to seriously look ahead at future risks"* he says.

"Unfortunately, our changing climate means Aotearoa is and will almost certainly continue to experience extreme weather events more frequently and more severe than it has in the past. Places which used to be 'safe' may no longer be – which is a scary prospect. We also continue to see other drivers of disaster risk continue to increase, such as social inequalities and development in risky areas. It is just so important that we learn from this event, identify any opportunities for improvement, and then actually implement them so we are more resilient. A critical part of this is ensuring the science system is well integrated within the emergency management system and well-resourced to support future disasters," says Tom.

> **"It is just so important that we learn from this event, identify any opportunities for improvement, and then actually implement them so we are more resilient."**

Image: Selwyn volunteers helping Auckland CDEM logistics personnel to load water to be delivered to Auckland's isolated communities. Image credit: NEMA

Reflections from our first Chief Mātauranga Advisor

Erica Gregory, Manahautū Kaupapa Kura Taiao, Environmental Protection Authority, tribal affiliations are to Waikato and Ngāti Maniapoto.

In October 2021, I was invited to join the CSA Forum as Chief Mātauranga Advisor. The purpose of the Forum includes addressing important questions relevant to Māori and incorporating Mātauranga Māori and Kaupapa Māori approaches as part of the evidence base.

To be clear, I am not a mātauranga expert. However, in my journey to encourage the voice of Māori in government processes and to recognise that mātauranga is essential to making good policies and decisions, I have had the exceptional good fortune to kōrero and wānanga with those who are. I am forever grateful for the learnings gained from their wisdom and generosity of sharing.

My role on the Forum is to encourage colleagues as they look for and create opportunities for the voice of Māori to be heard. Forum members, as leaders within our agencies, and across the public service, have a unique opportunity to influence the development of policy and the research that underpins this process. This includes how we recognise and give effect to mātauranga, alongside science and other fields of knowledge, in order to achieve positive change across all areas of our work.

In saying that, I am mindful of the responsibility we have to ensure that Māori take the lead in determining how and when mātauranga is used. Mātauranga is usually local and site-specific. It is tied to the wāhi tapu and taonga of tangata whenua, to their cultural values and practices.

An October 2022 report *When the Crown controls mātauranga: A report on a survey of Crown policies, programmes, legislation, funding, and impact assessment relating to Mātauranga Māori*[1] calls for a coordinated and principled approach to guide the interaction of agencies with Mātauranga Māori.

The report recommends a focus on the active protection of mātauranga through connecting, collaborating, and co-creating with Māori who are the kaitiaki of mātauranga. There is much we can do as a Forum to support this to happen.

Paimarire.

Erica

[1] A.T.P. Mead, V. Smith, J.Ataria, T.P. Wilson-Leahy, S. Ogilvie, E. Watene-Rawiri, H. Potter and M. Shadbolt. "When The Crown Controls Mātauranga: A Report on a Survey of Crown Policies, Programmes, Legislation, Funding, and Impact Assessment Relating to Mātauranga Māori," Biological Heritage National Science Challenge, Christchurch, October 2022.

The future of the census in Aotearoa

Vince Galvin, Chief Methodologist at Tatauranga Aotearoa Statistics New Zealand (Stats NZ), reflects on a potential alternate pathway for the census in Aotearoa which could avoid the complications and cost of a full enumeration approach.

Understanding how many people there are in country, and where they live, is a fundamental question to every government around the world. This data underpins the provision of effective services, from housing and transport to health and education, sheds light on the diversity of our communities, and helps government plan and respond to community needs.

To better understand its own population, New Zealand has been running a 'full enumeration' census every five years since 1851 (exceptions being during the great depressions, WWII, and after the Christchurch earthquake), aiming to reach and record every individual and household in the country. The most recent census took place in March 2023, with more than 4.5 million people taking part (as of June 2, 2023).

Although the census has been the go-to approach for

decades, it is a large, complex, and costly undertaking and declining response rates have undercut its effectiveness. With these challenges in mind, Chief Methodologist Vince Galvin and his team at Stats NZ have taken the time to reflect on alternative approaches. In recent years, these reflections have centred on the use of data from administrative sources – including tax records and birth registrations – and how this data could complement, and potentially replace, a full enumeration census.

As part of their experimental work, Stats NZ recently released their administrative population census (APC). The APC estimates New Zealand's resident population while tracking some 20 variables – including population structure, income, employment, and education – from 2006 to 2021 for each anonymised individual in the dataset, allowing an understanding of internal population flows. Moreover, the dataset

" This data underpins the provision of effective services, from housing and transport to health and education, sheds light on the diversity of our communities, and helps government plan and respond to community needs."

will continue to improve with time, says Vince.

"The cohort of New Zealanders born from about 1990 onwards are [already] well covered in administrative systems, so as the population ages, the proportion that are well covered by administrative data increases."

Importantly, an APC approach may present a viable alternative to the census. *"The files [APC data] have coverage rates better than running full enumeration collections, and they create the possibility of delivering population data more frequently for a significantly reduced cost"* says Vince. Given these potential advantages, StatsNZ will evaluate the pros and cons of using this data as a complement to, or in place of, data derived from a full census. *"The nub of these discussions will be identifying what sort of rich data resources could be developed… and what would need to be put in place so that*

the any information that was lost by not having a census was manageable," says Vince.

The APC dataset is publicly available so that interested researchers can examine the benefits and limits of measuring the population this way. The use of administrative data is an issue being discussed globally, explains Vince. *"While the Nordic countries have been using administrative data as the basis for their population and social statistics for some time, discussions about the future of census taking are likely to be taking place in the UK, Ireland and Canada. In all these countries there are similar stories to tell, declining response rates and increasing availability of other data sources leading the National Statistics Offices looking to find ways to work with their communities to chart a way ahead."*

Read more about the APC on Stats NZ website:

https://www.stats.govt.nz/experimental/experimental-administrative-population-census/

Te Tai Waiora, New Zealand's wellbeing

Tim Ng, Strategic Economic Advisor at Te Tai Ōhanga The Treasury, reflects on Treasury's first report on wellbeing, a new legislative requirement designed to assess the wellbeing of all New Zealanders.

Wellbeing in Aotearoa for most people has improved in many ways over recent decades, with average life expectancy increasing by several years, and rates of material hardship falling sharply. Yet active investment in the different kinds of wealth supporting wellbeing is required to ensure its sustainability into the future, according to a major report on wellbeing released in 2022 by the Treasury, in which Tim Ng, Strategic Economic Adviser, played a lead role.

The report *Te Tai Waiora: Wellbeing in Aotearoa New Zealand 2022* brings together wide-ranging data and analysis to describe the state of wellbeing in New Zealand, how it has changed over time, and the sustainability of, and risks to, wellbeing. *"For Te Tai Waiora and its background papers, we used hundreds of New Zealand and overseas data series covering several decades,"* says Tim. In addition, Tim is quick to acknowledge the experts outside of Treasury who helped shape the report.

"The Forum of Chief Science Advisers and individual Chief Science Advisers provided invaluable expertise and critique throughout the production of the report, with the Chief Science Adviser at the Ministry of Social Development, Professor Tracey McIntosh, playing a key role on the Treasury's Expert Advisory Panel for the report."

Like many studies of sustainability and wellbeing, the report views wealth comprehensively, as

"Moreover, clear risks to wealth and wellbeing lie ahead from climate change and biodiversity loss, and resilience at many levels is under pressure..."

comprising physical capital, human capability, the natural environment and social cohesion. *"The data indicate that while physical capital and human capability have been trending upwards and social cohesion is broadly flat, the natural environment is deteriorating in some important respects,"* says Tim. It is thus unclear whether overall wealth is on a trajectory supportive of wellbeing into the future, since these four kinds of wealth work together and interact in complex ways to support wellbeing. Moreover, clear risks to wealth and wellbeing lie ahead from climate change and biodiversity loss, and resilience at many levels is under pressure from rising psychological distress, diminishing housing affordability and declining basic skills achievement at school. *"We hope the insights in the report can inform deliberations and debate by Parliamentarians, Ministers, researchers, communities, and businesses about what they each can best do to support wellbeing in New Zealand,"* says Tim.

However, an effective response relies on accurate and comprehensive data, and important gaps remain. *"Building wellbeing in the face of complex challenges requires all of society to respond,"* says Tim.

"Comprehensive data at the level of individuals, households, businesses and regions, spanning decades, are urgently needed to better understand how human behaviour affects the sustainability of wellbeing in New Zealand, and to inform action."

Read the Treasury's report Te Tai Waiora: Wellbeing in Aotearoa New Zealand 2022 on the Treasury's website:

www.treasury.govt.nz/publications/ wellbeing-report/te-tai-waiora-2022

Combatting Food Waste

Over the course of the last year, our food waste project has kicked into gear with the release of several resources and reports.

Food waste poses environmental, social, and economic problems to countries across the globe. In 2022, we embarked on a major project to understand New Zealand's food waste problem, delve into its complexities, and develop evidence-based recommendations for action.

Globally, an estimated 40% of all food produced for human consumption is wasted annually. In Aotearoa, while the full extent of the problem remains unknown, available evidence suggests that it is significant, with hundreds of thousands of tonnes of food going to waste each year.

Recognising both the urgency and potential for positive change, our office has been working on a series of interrelated reports and resources that address different aspects of the food waste puzzle.

This approach has been supported by a fantastic reference group of some 400 individuals, spanning New Zealand researchers, government officials, international experts, and stakeholders from across the food system. A huge thank you to all who have pitched in so far.

In July 2022, we published the first report *Food waste: A global and local challenge*, which analyses the landscape of food waste in Aotearoa. The food waste problem is a multi-faceted one, with multiple underlying causes and impacts including the environmental impact of food waste and its contribution to global warming through the release of methane emissions from landfills. While the environmental impacts of food waste draw the headlines, the problem extends beyond environmental stewardship. Wasted food represents missed opportunities to nourish people, particularly

Food rescue in 2022
Where to from here?

The second report in the food waste series from the Prime Minister's Chief Science Advisor, Kaitohutohu Mātanga Pūtaiao Matua ki te Pirimia

October 2022

in a country where food insecurity affects a significant portion of the population.

Our second food waste report, *Food rescue in 2022: Where to from here,* explored redirecting surplus quality food to combat food waste and also delivering social benefits and promote food security. Food rescue organisations undertake tireless mahi using different models and at different scales. There will always be types of food waste that cannot be rescued or prevented, highlighting the need for a collaborative approach in tackling food waste. To help households keep food waste out of the bin, we developed a web resource *What can I do with my food waste?*, which explores how food waste can be transformed from rubbish to a resource within households, communities, and at industrial scales.

Currently we are investigating how to capture value from unprevented food waste and will explore options including upcycling and conversation. We anticipate then moving onto an exploration of food waste prevention. Food waste prevention can be addressed across all stages of the food supply chain, from primary production to consumer behaviour.

The food waste project is ongoing, and we continue to welcome new members into the reference group. If you'd like to get involved, contact us on info@pmcsa.ac.nz.

Image: Juliet and the team took a tour of the operations at Waiheke Resources Trust, learning about their work in food resilience, waste minimisation, and environmental restoration.

You can find our project framework and updates online at:

www.pmcsa.ac.nz/topics/food-rescue-food-waste/

"There will always be types of food waste that cannot be rescued or prevented, highlighting the need for a collaborative approach in tackling food waste."

Minimising gang harms

Toward an understanding of adult gangs in Aotearoa New Zealand

Gangs are a global phenomenon and have long been a feature of society in Aotearoa. The 1950s are generally accepted as the point at which gangs as we know them today first emerged and there have been various evolutions to the gang landscape since. Despite their long-standing presence in our social landscape there is surprisingly little known about them. With this in mind, we sought to produce an evidence synthesis on adult gangs in New Zealand to shed light on the harms by, to, and within gang communities. Importantly, we wanted to look beyond individual gang membership to understand the experiences of women and children who also exist in gang environments.

Our report *'Toward an understanding of Aotearoa New Zealand's adult gang environment'* does not make recommendations. Instead, it is our hope that the report provides a useful overview to support policy writers and decision makers in developing legislation that takes an evidence-based approach to addressing harm in our communities.

While the academic literature on gangs is extensive, we identified some limitations early in the life of the project. Firstly, much of the available gang literature is developed in the US and Europe with their own respective cultural, social, and historical contexts. Secondly, there is a dearth of academic literature to describe the experiences of women and children who exist within gang communities. We know that women and children not only exist within gang communities but that in some cases they serve a role in the function of the gang. These limitations necessitated looking beyond the academic literature. To develop an understanding of adult gangs in Aotearoa, we extended our scope to consider the available grey literature and to engage with stakeholders with a range of experiences interacting with gang members and gang communities.

With guidance and support from Professor Tracey McIntosh (CSA, Te Manatū Whakahiato Ora Ministry of Social Development) and Professor Ian Lambie (CSA, Tāhū o te Ture Justice Sector) we engaged researchers (both national and international), government agencies, service providers, community groups, and those with lived experiences from across the motu. As you can imagine, the subject of gangs is complex and can be very polarising. Yet, we were overwhelmed by the number of people and organisations that were eager to talk with us. We had many illuminating discussions around the complex harms that exist within gang communities and heard of some heartening opportunities to bring about positive change that would benefit all of New Zealand. We would like to extend our thanks to those who took the time to share their knowledge and experiences with us. Your insights have made the report much richer. We would also like to thank our expert peer reviewers who took the time to read through our report and provide insights to help refine the work even further.

Read the report:

pmcsa.ac.nz/topics/evidence-summary-on-minimising-harm-from-and-within-gangs-in-aotearoa/

Polluted information

Equipping young people with the skills needed to navigate polluted information and the online environment.

The online environment is changing rapidly from AI to new social media platforms and platforms being continually updated. What our young people are navigating today is drastically different to ten years ago, and in ten years, it will be drastically different again. Significant opportunities exist, and our young people must be given the skills and knowledge to harness these. But equally important is ensuring that they are equipped to navigate the challenges. Polluted information is an umbrella term that encompasses misinformation and disinformation, acknowledging that all of us face an environment polluted by misleading or false information.

The educational response to polluted information is the focus of this project. It will examine how media and information literacy, and digital citizenship can impart the skills, values, attitudes, dispositions, and knowledge that are helpful for our young people to possess as they navigate this environment. Professor Melinda Webber (Ngāti Kahu, Ngāti Hau, Ngāti Hine, Ngāpuhi, Ngāti Whakaue), a professor at the University of Auckland and Professor Stuart McNaughton (CSA, Te Tāhuhu o Te Mātauranga Ministry of Education), are co-authoring the report alongside the Office. They have brought a depth of experience and knowledge of the education system and an understanding of how media and information literacy, and digital citizenship might be better integrated.

We have engaged widely with stakeholders and researchers across Aotearoa and visited several schools. What this engagement has made clear is that a whole-of-system approach is needed and that schools and teachers will need support to implement this in the classroom.

The challenges young people are facing, particularly polluted information, are changing and expanding so rapidly that an approach needs to be forward-looking, ensuring the system is ready for these changes as they occur.

Read more:

pmcsa.ac.nz/topics/build-ing-youth-resilience-through-crit-ical-thinking-and-digital-citizen-

Top Left: Melinda at the Tampere Museum being interviewed for a media class
Top Right: School visit to Pegasus Bay School
Bottom left: Colson and Melinda at Save the Children Finland with their team and Lauri Palsa from KAVI
Botom Right: Juliet and Caroline Flora, Chief Censor of Film and Literature

AI in healthcare

AI has the potential to improve our lives in meaningful ways, but also comes with risks which must be mitigated.

The arrival of ChatGPT late in 2022 crystallised for the public the potential of AI to bring about massive changes to the way we live, work, and interact. AI has the potential to improve our lives in meaningful ways, but also comes with risks – some of which are known or foreseeable, some of which are not – which must be mitigated. The Prime Minister has asked us to look at AI, with an initial focus on the potential opportunities of AI in healthcare.

Inspired by the project, and wanting to understand more deeply the current capabilities of generative AI, we've undertaken a fun experiment in writing up this part of the annual report. On the next page are two summaries of our AI work. One was written in the standard way by the team (left), and one by Bing's Bard (right). For Bard's version, we gave it the project's draft *Terms of Reference* and asked for a summary of less than 250 words that clearly explained the project to the general public.

Above: Our team and the expert panel members. From left to right: Rebecca Benson, Emma Brown, Vithya Yogarajan, Juliet, Ian Town, Alistair Knott, Robyn Whittaker, Karaitiana Taiuru, Megan Tapsell, James Maclaurin, and Michael Witbrock.

Our AI work

   This project is new for 2023. The main focus is exploring the opportunities AI affords to improve healthcare delivery. Ahead of this, we are completing some background work that will inform this and other workstreams. In particular, we are producing a snapshot of how emerging issues are being managed within existing or new regulatory frameworks across jurisdictions; this will be continually updated as the project evolves. We will also create a hub that curates resources to help the public and other stakeholders understand the implications of AI, and selectively produce explainer documents where there are gaps in existing resources. In addition, we will scope a series of future topics where AI is impacting our lives and creating opportunities, for consideration by the PM post-election.

   In healthcare, we are exploring the opportunities and challenges at the intersection of artificial intelligence and healthcare delivery. The scope for this part of the project has been finalised in conjunction with an expert panel, comprising a growing pool of expertise in New Zealand. The expertise of the panel is diverse, covering computer science and AI technologies, psychology, the NZ health system, Māori data sovereignty, ethics and other topics. We have also assembled a broader reference group, open to any interested stakeholder, who will have the opportunity to feed back on this work periodically. Our AI in healthcare panel is co-chaired by CSA Dr Ian Town (CSA, Manatū Hauora Ministry of Health) and will result in a short report ahead of the election including recommendations for government.

Our AI work - Bard generated text

Artificial intelligence (AI) has the potential to transform healthcare delivery in Aotearoa New Zealand. This project will explore the opportunities and challenges of AI in healthcare, with a focus on the following areas: data collection, use, and management; individual access to and analysis of biometric data; imaging and diagnostics; visual and hearing aids; research, teaching, and training.

The project will also consider the ethical and legal implications of AI in healthcare. It will be guided by an expert panel and a wider reference group, and will include wide stakeholder engagement. The project will deliver a short report to the Prime Minister in September 2023.

The project is timely, as AI is rapidly evolving and has the potential to transform healthcare delivery. The project will help to ensure that Aotearoa New Zealand is well-positioned to benefit from the opportunities of AI in healthcare, while also addressing the challenges.

Here are some of the key benefits of AI in healthcare:

• Increased efficiency and accuracy of diagnosis and treatment
• Improved patient outcomes
• Reduced costs
• Increased access to healthcare

Here are some of the key challenges of AI in healthcare:
• Ethical and legal concerns
• Data security and privacy
• Job displacement
• Lack of public trust

The project will address these challenges and help to ensure that AI is used in a safe, ethical, and beneficial way. The project is ambitious, but it is essential that we start to explore the opportunities and challenges of AI in healthcare now. The project will provide valuable insights that will help to shape the future of healthcare in Aotearoa New Zealand.

Internship and fellowship programme

Building links between science, research and policy.

The Office runs an internship and fellowship programme that invites researchers to work with our Office on projects that sit at the science-policy interface. Through this programme, this year we've had the privilege of working with a total of 14 interns and seconded fellows.

We're grateful for the support provided by Te Wānanga Aronui o Tāmaki Makau Rau Auckland University of Technology, Te Kunenga ki Pūrehuroa Massey University, Waipapa Taumata Rau University of Auckland, Riddet Institute, Te Koronga and Te Pūnaha Matatini. The programme wouldn't be possible without your support. We also had two Tairāwhiti interns, whose placements were supported by the Prime Minister's Emerging Priorities Fund.

Read about our 2022-2023 cohort over the following pages. If you're interested in joining us as an intern or fellow, get in touch: info@pmcsa.ac.nz

Read more about our internships and fellowships:

**pmcsa.ac.nz/what-we-do/
internships/**

With thanks to:

Brittany Bennenbroek has a Postgraduate Diploma in Science in Psychology, and is currently completing the Master of Science in Society at Te Herenga Waka Victoria University of Wellington. Brittany's internship explored the effect and timing of past policy changes aimed at improving a culture of inclusion, or kindness in research in Aotearoa.

Dr Jared Carpendale is a Senior Lecturer in Teacher Education in the Institute of Education, Te Kunenga ki Pūrehuroa Massey University. He has a PhD in education with a focus on science education and was a science, chemistry, and physics teacher for a decade. His research interests include supporting teachers to develop their specialised knowledge to effectively plan and teach science. Under the guidance of Professor Stuart McNaughton (CSA, Te Tāhuhu o Te Mātauranga Ministry of Education), Jared's fellowship is exploring science education in New Zealand primary schools.

Emma Coultas has a Bachelor of Science in Geography & Sociology and graduated from the Master of Disaster Risk and Resilience programme at Te Whare Wānanga o Waitaha University of Canterbury. Emma's project focuses on coordinating the national science response to the Cyclone Gabrielle recovery. She is working with Tom Wilson (CSA, Te Rākau Whakamarumaru National Emergency Management Agency) to provide national support to locally led science, mātauranga, and Te Ao Māori initiatives.

Dr Priyanka Dhopade has a background in aerospace engineering and industrial research from the University of Oxford. Her current research at Waipapa Taumata Rau University of Auckland is in sustainable engineering with the use of lifecycle assessments and whole systems thinking. Her fellowship will explore the sustainability of space activity from a lifecycle perspective that accounts for the environmental, social, cultural, and economic impacts of space technology.

Dr Revel Drummond is a plant molecular biologist at Plant & Food Research. His research is focused on plant architecture and the plant hormone strigolactone. Revel's fellowship is exploring how the science of CRISPR-Cas gene editing has been accepted or not, by different countries and cultures.

Dr Becs Jarvis is a Senior Lecturer in Marine Social Science in the Department of Environmental Science, School of Science, at Te Wānanga Aronui o Tāmaki Makau Rau Auckland University of Technology. Her research interests include the high seas, marine science, marine social science, ocean governance, marine management, transdisciplinary research, and knowledge-policy-action. Becs' fellowship explores the relevance of what happens in the high seas for out future ocean and Aotearoa New Zealand.

Richard Marks is a Masters student at Te Whare Wānanga o Otāgo University of Otago studying Science Communication, with a background in neuroscience. He is interested in how science advice contributes to policy making, and how to provide balanced science advice that looks at all available evidence. While interning with the Office in 2022, Richard drafted infographics to support our food waste project.

Dr Hannah McKerchar is a Riddet funded intern. Hannah has a PhD in biochemistry which mapped changes in food proteins and has a background as a commercial litigation lawyer. Hannah's project is exploring how to improve the use of research evidence and connections with policy in Aotearoa.

Dr Ngahuia Mita (Te Aitanga ā Māhaki, Ngāti Porou, Ngāti Hako) was one of two Tairāwhiti interns with our Office. For her internship, Ngahuia is applying a te ao Māori perspective to examine the climate emergency, using tūpuna waka landing sites in Tairāwhiti to anchor her exploration of this crucial topic. This project was supported by the Prime Minister's Emerging Priorities Fund. Ngahuia has transitioned to a fellowship funded by Te Koronga.

Dr Olivia Ogilvie has a PhD in Biochemistry from Waipapa Taumata Rau University of Auckland, where she studied coeliac disease. Her work now focuses on cellular agriculture and future protein sources, with a particular interest in the regulatory, policy and ethical implications of emerging food technologies for Aotearoa. She is a part-time seconded fellow with the Office, where she has helped us stay on top of developments relating to the future of food.

André Oliveira has a Master of Public Policy at the University of Oxford. His internship with the Office explored food loss and waste at the primary production stage of the food supply chain, with a particular focus on the impacts of climate change and related extreme weather events.

Ben Thurlow is a human geographer and social scientist studying for a PhD at the University of Cambridge. His doctoral research focuses on the public communication of the COVID-19 pandemic in Aotearoa. His internship project explores New Zealand scientists' reflections on the public reception of the science communication during the COVID-19 pandemic, considering both the successes of the government's response as well as potential lessons for the future.

Read more about Ben's internship on page 33.

Tanith Wirihana Te Waitohioterangi (Rongowhakaata, Ngāi Tāmanuhiri, Te Aitanga a Māhaki, Rongomaiwahine, Ngāti Oneone) is a public policy and political science student with a passion for progressive policy and Māori culture, knowledge systems and customs. For his Tairāwhiti internship, Tanith is working with Museum of New Zealand Te Papa Tongarewa to build a database of taonga from the Tūranganui-a-Kiwa | Gisborne region that were taken by Captain Cook, including those of scientific interest. his project was supported by the Prime Minister's Emerging Priorities Fund.

Read more about Tanith's internship on page 38.

Communicating COVID-19: a chance to reflect

Analysing government communications during the pandemic offers the chance to reflect - both in readiness for the next pandemic, but also about how we communicate as a society more broadly.

Communicating in times of crisis is an art. When a politician, scientist or public servant stands up to communicate in an emergency, the smallest details can prove vital: a jarring tone of voice, a well-chosen metaphor, or a memorable turn of phrase can transform how people make sense of an issue and, therefore, how they might respond to it.

Rarely has this been more squarely in the spotlight as with the COVID-19 pandemic. Joining the Office as part of his PhD studies, Ben is researching the New Zealand government's communications during its response to the pandemic.

Though many of the lessons learned concern specificities of the public health response, several cross-cutting themes are emerging. *"Throughout the pandemic,"* Ben suggests, *"what appears to be crucial is striking the right balance within a number of key tensions, such as walking the tricky line between informing the public while also inviting and persuading them to act, or between being honest about uncertainty while simultaneously providing reassurance, to name but a few."* The need to manage expectations – *"trying to present an honest picture of the future, even if it makes things difficult in the present"* – as well as the profound importance of diversity among communicators are also becoming increasingly clear.

What seems to be most significant, though, is the balance between clarity and nuance: *"communicating in a strong, clear manner, while never allowing a desire for simplicity to erase the complexity of the situation."*

This last point in particular, Ben argues, draws attention to the importance of not just what a communicator says, but to the surrounding environment in which the communication occurs.

"The most successful communication seems to happen when there is space afforded within public and political discourse for nuance, mutual listening, and complexity. I think the pandemic has shown the tremendous value of moments like this – where the public, the media, and politicians all allow room for an open dialogue, resisting the temptations of tribalism or impulse characterisations and instead engaging authentically with the issue at hand – as well as the problems caused when this is not the case."

Researching the pandemic therefore offers the opportunity not just to prepare for the next crisis, but to reflect more broadly about how we communicate as a society. If we are to learn these wider lessons, Ben suggests that we need to invest time and energy in researching how to cultivate a more nuanced culture of communication.

Above: Jacinda Ardern and Ben Thurlow

Improving the connections between policymakers and research

The Office has an on-going project on improving the connections between policymakers and research and in 2021 one of our Fellows, Dr Cate Roy produced a report *Enhancing knowledge sharing between academics and policymakers in Aotearoa New Zealand*. In response to Cate's findings that, despite academia and policy being worlds apart, there is an *"overwhelming appetite on both sides"* to bridge the gap. Dr Hannah McKerchar's internship, has continued initiatives to help feed that appetite and build an enduring bridge between science and policy. One of the underlying barriers to sharing knowledge between researchers and policymakers is a lack of understanding of how the different worlds work and difficulties in making the initial contact.

With funding from the Riddet Institute, Hannah has designed resources to help researchers learn more about the research/policy interface. She made an animation aimed at early career researchers that highlights the challenges of connecting with policy and offers solutions. She has also developed a policy brief template with animated guide to help researchers begin the journey of translating their work for a policy audience. The resources are designed to help researchers concisely say, *"This is the science, this is what it means, this is how it relates to policy, how can I help?"*.

Specifically, for the Riddet Institute, she prepared a case study of how researchers from the Institute have impacted policy, and a booklet profiling researchers at Riddet with an explanation of how their research is relevant to policy. The booklet is designed to be shared with Ministries or local government officials as an enduring reference to the policy relevant science at the Riddet Institute. The aim is now to expand this to beyond Riddet.

To complement these resources, the Office is planning a series of events in late 2023 where researchers can meet policy makers and learn more about the policy world from them. The intention is to foster opportunities to connect and grow a network of connections between researchers and policy makers.

Top: Dr Hannah McKerchar
Bottom: Dr Cate Roy

See Hannah's resources:

tinyurl.com/hannah-policy

Read Cate's report:

ojs.victoria.ac.nz/pq/article/ view/8018

Exploring the whakapapa embedded in waka hourua sites of Te Tairāwhiti

I tēnei wā kei te kaha rongo tātou i ngā putanga o te huringa āhuarangi. Mō tēnei kaupapa kei te tirohia a Tākuta Ngahuia Mita (Te Aitanga a Mahaki, Ngāti Porou, Ngāti Hako) i tēnei take o te huringa āhuarangi, mai i etahi tauranga waka tawhito ki Te Tairāwhiti

He maha ngā whakapapa kōrero ki uta, ki tai hurinoa i Te Tairāwhiti. Nā reira he hiahia nō Ngahuia, kia kite ai i ngā whakawhitinga o ngā tauranga waka ō mua (Pērā i Te Wherowhero lagoon, i a Te Toka a Taiau, i a Onepoto ki Turanga) - nā te huringa āhuarangi.

Kei roto i etahi o ngā pūrākau - he kōrero e pā ana ki te āhua o te whenua i taua wā. Kei Te Wherowhero, he kōrero tawhito e pā ana ki te maha o ngā kōwhai - nā reira ka whakatō anō te whānau i tēnei rākau Māori, heoi ko te patai nui ka taea tonu te tipu ki kō?

He maha ngā kura huna ki rō ngā pūrākau - ā kei te rapu tonu ngā whānau, hapū, iwi. Heoi ināiatonunei - he take nui ake i Te Tairāwhiti.

Kei te whakaora tonu ngā whānau i a rātou kāenga - ā kei te rapu tonu tātou i ngā ara hei haere tonu - kei konei te huringa āhuarangi ināianei. Iti noa hoki te rangahau e pā ana ki tēnei take - ki Te Tairāwhiti. Nā reira me whakarongo ki te reo ō te whenua, me ngā tāngata whenua, ehara tēnei take i te karere noa ki Te Tairāwhiti - he oranga.

Ko tētahi ara hei āwhina, ko ngā waka. E ai ki Ngahuia ko te waka hourua he kairaranga tāngata, kairaranga whenua, kairararanga whakapapa. Nā reira kei waenganui i ērā kaupapa e toru ngā whakautu - me whakarongo ki ngā tāngata whenua ka tika. Ko Ngāi Māori ngā tāngata e noho ana ki tēnei whenua mai rā anō - nā reira ko mātauranga Māori tētahi ara hei whai oronga - hoake tātou.

"Māori people have the longest experience of climate in this country, with an intimate knowledge of seasonal patterns and climatic shifts."

Credit: Monty Soutar, 'East Coast region - Overview', Te Ara - the Encyclopedia of New Zealand, https://teara. govt.nz/en/map/33350/waka-landings-places-of-significance-and-tribes (accessed 3 July 2023)

Dr Ngahuia Mita is a fellow with the Office funded by Te Koronga and as part of her project, she is applying a te ao Māori perspective to examine the climate emergency. Some of these pūrākau (stories) reflect on the conditions of the whenua when the Māori first landed along the shores of Te Wherowhero. From one conversation, Ngahuia uncovered long-told stories of communities planting native trees in the vicinity of waka landing sites, with species like kōwhai flourishing. However, communities today are uncertain whether current climatic conditions would allow new plants to flourish, explains Ngahuia. *"Communities are asking if all their planting efforts are worth it, will the plants thrive?"*

While some pūrākau provided Ngahuia with insights into historical waka landing sites, the stories of many sites remain a mystery. *"There would have been upward of fifty canoes arriving in Te Tairāwhiti, with numerous landing sites. In many places, we simply don't know what these sites looked like,"* says Ngahuia. She thinks that many stories and sites are being rediscovered within whānau, hapū, and iwi, but communities in Te Tairāwhiti have their hands full in dealing with the present-day effects of climate change. *"The damage done by recent cyclones means there hasn't been time or space to talk about or disentangle the long-term effects of climate change,"* says Ngahuia.

Ngahuia stresses the importance of whakapapa when thinking about how Māori communities in Tairāwhiti may perceive and engage with the climate emergency. *"It's our people that have been inhabiting these places and landscapes, and we have a rich depth of history within them. If you look at the effects of these recent extreme weather events – the washed-up forestry slash, the dead koura, the pāua on the beach – for most people that's a terrible picture on a TV, but for Māori communities living in these places it's a deeply cultural and spiritual connection we have to those things."*

Ngahuia's research to better understand climate change is driven by her love of the waka, which she thinks of as a *"weaver of people, place, and whakapapa"* and inspiration for doing mahi on addressing the climate emergency. In tackling this mammoth challenge, Ngahuia emphasises the importance of including Māori voices as we shape our response.

"Māori people have the longest experience of climate in this country, with an intimate knowledge of seasonal patterns and climatic shifts. There are so may solutions, ideas, and wisdoms that come from a Māori worldview and mātauranga… including these is deeply important." There's no time to lose, says Ngahuia, *"we must all just set sail and get out there"*.

Tairāwhiti Waka on the eastern horizon at sunrise by Ngahuia Mita

Te Paepae o Te Rātū: He whāinga takahanga waewae nō tuawhakarere

The threshold of Te Rātū: A pursuit of footprints from the distant past.

Tanith Wirihana Te Waitohioterangi came to us on an internship with funding from the Prime Minister's Emerging Priorities Fund and support from the Te Aitanga a Māhaki Trust, Rongowhakaata Iwi Trust, Ngāi Tāmanuhiri, and Te Runanganui o Ngāti Porou to mark the Tuia-Encounters 250. Tanith's main project, based at Museum of New Zealand Te Papa Tongarewa, was to look at the identities and current locations of the taonga attributed to Rongowhakaata iwi and hapu that were taken by Cook on his first voyage. But as is so often the case, it was the contextual information around the data that proved the most interesting. Alongside the dry spreadsheet of artifacts, Tanith wrote a narrative of the omens leading up to Cook's arrival and his first four days in Aotearoa from the perspective of the people on the beach, not the often-heard people on the boat.

The narrative locates the events of the Cook collision within the maramataka lunar calendar; using months recorded by Tairāwhiti tohunga for 1769.

To determine the specific lunar phase for the dates of the encounter provided by the Endeavour crew, the dates were reconciled (the international date line wasn't established until 1884) with algorithmic data from the United States Naval Observatory and NASA to determine the precise lunar phase. The result is a fascinating look at how two cultures, each with their own ways of thinking, collided on the beaches of Tairāwhiti only 12 or so generations ago. Traditional peer reviewing of the narrative didn't seem appropriate, so we sent it out to experts in the field for their comments and we are very grateful to them for allowing the comments in full to be shared alongside the narrative itself.

Read Tanith's report:

pmcsa.ac.nz/topics/te-paepae-o-te-ratu-he-whainga-takahanga-waewae-no-tuawhakarere/

Out and about

The team has been out and about engaging in interesting kōrero over the past year, as well as connecting virtually with colleagues from Aotearoa. Here's a selection of our activities.

Top left: The team
Top middle: Dr Sarah Kessans, Dr Susie Meade and Professor Emily Parker at the NZ Agricultural Climate Change Conference
Top right: Juliet at SciCon2023
Bottom left: Juliet with a panel at MOTAT
Bottom right: Juliet and the team with Jacinda Ardern

Clockwise: Juliet and the compost bin at the office, Juliet and Ben Thurlow, the team outside during an emergency drill, George standing by a pile of compost at Living Earth.

International Engagements

After several years of interacting with the international community remotely, it has been great to be able to connect in person again. This year the (fully vaccinated!) team have been making the most of the opportunity to travel and learn from colleagues in other countries. Here's a quick summary of where we have been and what we got up to while we were there.

Forum of Australian Chief Science Advisors (FACS) Melbourne

Juliet's counterpart in Australia, Dr Cathy Foley, convenes a group of chief scientists from each state a few times each year. New Zealand is grateful to be included in this group. Pre-COVID-19, we had been gathering twice a year in person and engaging with researchers and officials in different states. Over the last three years, we have connected by Zoom, but with a steady turnover of Chief Scientists in different states, it was great to get back to in-person meetings again.

Juliet visited Melbourne in April, catching up on the Australian research prioritisation process, and enjoyed visiting some of the new developments at Monash University. The synchrotron, in which NZ is a partner, is expanding its capability significantly and just next door Moderna is building a factory to manufacture RNA vaccines, providing new opportunities for fruitful trans-Tasman collaboration.

We were to host a FACS meeting in New Zealand, which would have been the first, but was scuppered by COVID-19; we hope to get back on the schedule soon!

"...with a steady turnover of Chief Scientists in different states, it was great to get back to in-person meetings again."

Above: FACS tour of Monash

Federation of Māori Authorities (FOMA) – Māori Science and Innovation Delegation to Australia

The team at OPMCSA was invited to join the Federation of Māori Authorities (FOMA) – Māori Science and Innovation Delegation. In July 2022, Juliet and Emma Brown joined a delegation with representatives from FOMA, National Science Challenge – Science for Technological Innovation, Ngā Pae o te Māramatanga, Hīkina Whakatutuki Ministry of Business, Innovation & Employment, and Kiwa Digital. While in Australia we were joined by representatives from the Commonwealth Scientific and Industrial Research Organisation and representatives of Aboriginal and Torres Strait Islander communities. The delegation met with CSIRO research teams in Brisbane, Canberra, and Sydney to learn more about the exciting research innovations underway, with the aim of forming new research networks between FOMA, CSIRO, and the wider delegation.

While in Canberra, an Indigenous Trans-Tasman Strategic Alliance Agreement on Science and Innovation was signed between FOMA (on behalf of all Māori) and Indigenous Leaders and witnessed by CSAs from both Australia and New Zealand. The document signing represented an ongoing commitment to maintain regular Trans-Tasman engagement, with the aim of developing quality relationships and to seek out possible joint projects that improve the standards of living and quality of life for indigenous people and communities.

At the end of the week, some delegation members stayed on in Sydney to attend the Australia New Zealand Leadership Forum (ANZLF) which gave us an opportunity to hear from senior business and government voices from across the Tasman. FOMA Chair, Traci Houpapa, shared the news of the signing of the ITSAASI with the wider forum.

While at the ANZLF, Juliet addressed the conference during the Trans-Tasman, Research and Innovation Cooperation session, sharing about the innovations in science and technology we had been privileged to hear about through the week. The team were grateful to have been invited to join the delegation and we look forward to our ongoing relationship with the team at FOMA.

> **"The document signing represented an ongoing commitment to maintain regular Trans-Tasman engagement, with the aim of developing quality relationships and to seek out possible joint projects that improve the standards of living and quality of life for indigenous people and communities."**

Above: Taken at the 2023 FOMA business summit with the signed agreement representation from the Aboriginal and Torres Strait islander signatories. Juliet and Dr Cathy Foley, Chief Scientist in Australia, witnessed the agreement in support of this Kaupapa.

Building resilience in young people

As part of our project aimed at improving the resilience of our young people to polluted information (page 25) the team visited Finland and Estonia, recognised as leaders in teaching information and media literacy, in May.

One of the challenges of building on international best practice is that not everything that works overseas necessarily translates to our context. So, we were lucky that Prof Melinda Webber, an expert in Māori education and student success (and part of the writing team for our report), joined us on the trip to help translate what we learned there into useful tips for Aotearoa.

It was a packed programme of visits to schools, libraries, research groups, NGOs and Government officials. A few particular highlights were KAVI, the National Audiovisual Institute in Finland, which gave great insight into the importance of a national body coordinating media literacy and Verke - National Centre of Expertise for Youth Digital Work.

Fighting marine plastic pollution in Indonesia

Late in June, Juliet joined an MFAT delegation to the ASEAN-Indo-Pacific Workshop on Marine Plastics Debris at the Regional Capacity Center for Clean Seas, Indonesia. She, along with two of the expert panel members, talked about the Rethinking Plastics project and how it might contribute to international solutions across the Pacific. This was a fantastic opportunity to elevate the work to an international level in the context of an international problem that is felt especially acutely in Indonesia.

Above : Colson and Melinda with the team from Verke, an organisation supporting digital youth work in Finland
Below: Plastic burning on the beach, Indonesia. **Credit:** Olga Pantos

Truth, Trust and Hope in Washington

Juliet last visited Washington in 2019 and was delighted to reconnect with old colleagues and meet new ones at the National Science Foundation (NSF) and the White House Office of Science and Technology Policy (OSTP). It was very useful to understand the NSF international funding priorities and how to maximise opportunities for collaboration with NZ, and understand the emerging research to policy issues, especially in AI, to inform our new project in this area.

The timing of the trip coincided with a Nobel Summit on Truth, Trust and Hope, which was held at the National Academy of Sciences and attracted a stellar crowd of speakers with insights into tackling the crisis of our polluted information landscapes, which is accelerating with developments in AI. Despite the scale of the challenge, the summit maintained a hopeful outlook, bringing together a diverse range of perspectives to strengthen our toolbox in building trust in science and creating algorithms that promote positive change. A particular highlight was the keynote from Maria Ressa.

"...how to maximise opportunities for collaboration with NZ, and understand the emerging research to policy issues, especially in AI"

Top: Juliet and Dr Arati Prabhakar, Director of the Office of Science and Technology Policy (OSTP)
Left: Juliet meeting with Director Dr. Sethuraman Panchanathan (centre right) and the National Science Foundation team.

FINANCES

2022–2023

Budget estimates.

The activities of the Office are funded under a MoU between Waipapa Taumata Rau University of Auckland, the DPMC and Hīkina Whakatutuki Ministry of Business, Innovation & Employment. The forecasted expenditure from this contract is included here. These are budget estimates, not financial statements. The University of Auckland continues to support the activities of the Office by providing institutional support, meeting facilities, and access to financial and administrative services. We would like to particularly acknowledge the following key individuals within the University for their support: Nikki Andrews, who keeps an eye on our finances; and Ranmali Mada in the Office of the Vice Chancellor, who provides a vital link to administrative services. We also thank the DPMC for providing hot desk facilities and general support, in particular Ruth Fairhall, John Scott, Hayden Glass, and Chris O'Gorman.

	1 July 2022 - 30 June 2023*
Funding received from DPMC for operations of the Office under the MoU	795,000
Funding received from MBIE for operations of the Office under the MoU	500,000
Breakdown of MoU Funding	
Salaries/people costs	1,030,000
Research costs	120,000
Operational costs	50,000
Domestic travel, Wellington	35,000
Other domestic travel	30,000
International travel	30,000
Total expenses	1,295,000

Honorarium to Juliet Gerrard (this is a direct payment outside of the MoU)	50,000

*Budget estimates do not include in-kind contributions.

Whaowhia te kete mātauranga

Ngā mihi nui
ki a koutou katoa