Proposal	Contact PI's Surname	Initials	Application Number	Panel
Standard	Salmond	A	20-UOA-260	SOC

MARSDEN FUND FULL RESEARCH PROPOSAL

Standard Application Form

1A. TITLE OF RESEARCH PROPOSAL

Let the River Speak: Working across 'worlds' for socio-ecological transformation

1B. IDENTIFICATION

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1D. SUMMARY

In the 2017 Te Awa Tupua (Whanganui River) Act, Aotearoa New Zealand became the first nation-state to recognise a river as a legal person. Our project will build on this world-leading initiative by finding new ways to give a river voice, and to revitalise rivers as living communities of landscapes, plants, animals and people.

In conversation with other leading projects of socio-ecological restoration in Aotearoa, Tahiti and Germany, Let the River Speak will explore how best to engage across different knowledge traditions; to transcend modernist divisions between theory and practice, people and the environment, nature and culture: and to revitalise overlooked genealogies that link the arts, humanities, technology, and the natural and social sciences.

Based on a pilot study of rivers across New Zealand, including the Waimatā River in Gisborne that is this project's focus, Let the River Speak is designed to foster globally innovative exchanges across different disciplines and ways of thinking, local communities (including iwi, local and central government agencies, farmers, foresters, riverside residents, businesses and those who paddle, row, fish and swim in the river), and a range of practical interventions aimed at restoring river communities to a state of ora – prosperity, health and wellbeing.

2A. BACKGROUND

Ko au te awa, ko te awa ko au — *I am the river, the river is me*
Kei te mate te awa, kei te mate ahau — *If the river is dying, so am I* (Whanganui elder)

'The river has taught me to listen; you will learn from it too. The river knows everything; one can learn everything from it. You have already learned from the river that it is good to strive downwards, to seek the depths.' (Hermann Hesse, *Siddhartha*) [1]

In the Urewera Act (2014) and the Te Awa Tupua (Whanganui River) Act (2017), legal relationships between people, land and waterways were radically reframed in Aotearoa New Zealand.[2] Rather than 'ownership' and property rights, world-leading legislation expressed relationships in terms of whakapapa – ancestral ties between people, land and waterways. Rivers and land alike are recognised as older and more powerful than people, and relationships with these places as existential interlocks in which the ora (health, prosperity, well-being) of land, waterways, plants, animals and people is mutually implicated.[3]

These legal innovations have attracted much global attention, with international and local scholars recognising their promise for new ways of understanding and tackling complex socio-ecological challenges.[4] In Aotearoa, too, the search for ora (well-being) is influencing other areas of life, for instance healthcare (Whai Ora),[5] social welfare (Whānau Ora)[6], economic activity (the country's Well-Being Budget),[7] and industries such as tourism (the 'Tiaki Promise' – taking care of people and land).[8]

In these ontological experiments,[9] spaces are opening up for research across disciplines and knowledge traditions, exploring complex exchanges between land, the ocean, the atmosphere, waterways, plants, animals and people. Such relational, outcome-focused styles of research have the potential to transcend modernist divisions between theory and practice, people and the environment, culture and nature;[10] and to revitalise overlooked genealogies that link different knowledge systems, the arts, humanities, technology, and the natural and social sciences.[11]

In a preliminary project, 'Te Awaroa: Restoring Rivers across Aotearoa New Zealand,'[12] led by the same principal investigators and funded by the Tindall Foundation, the NEXT Foundation, the University of Auckland SRIF fund and Ngā Pae o te Māramatanga, we engaged with international and local colleagues, students, and local communities to explore new ways of thinking about waterways as living systems. In the process, we brought together insights from wānanga and mātauranga (Māori ancestral knowledge) with ecology, geology, river science, geomorphology, Māori and settler histories and legal research, producing technical reports,[13] a book[14] and articles[15] that have been widely cited, and helping to inspire collaborative initiatives in river restoration.[16] The team is highly productive, with members globally recognised for their innovative thinking about environmental questions across different knowledge traditions and disciplines.

This new project will build on this promising beginning with a deeper, more ambitious inquiry into the life and future of a particular waterway, the Waimatā River in Gisborne. This river is historically significant as a major voyaging site, a landing place for the *Tākitimu* and *Horouta* waka (canoes), and the *Endeavour*, which landed the first Europeans ashore in Aotearoa; and as an inland highway from Tūranganui (Gisborne) to Te Tairāwhiti (East Coast).

From its headwaters in steep hillside forests and farms, the Waimatā runs through lifestyle blocks, horticultural properties and suburbs into the centre of Gisborne city, the port and the harbour. The lower reaches of the river are heavily used by waka ama (outrigger canoe) paddlers, kayakers, rowers, fishers and swimmers, but are choked with sediment and polluted by sewage. In its history and its current state, the Waimatā River exemplifies many of the challenges faced by waterways across Aotearoa, and around the world.[17]

Our team will bring together iwi researchers and wānanga experts, scholars and students from an array of disciplines, including earth system science, geomorphology, microbiology and infectious diseases, forest ecology, anthropology, creative practice and business studies to investigate the life of the Waimatā River community, weaving together insights across multiple dimensions. An emerging approach to the conduct and generation of a 'river ethnography' will explore wider philosophical and practical questions about waterways through an in-depth examination of the life of a particular river

community, past and present, with its landscapes, plants, animals, viruses, bacteria and people. By creating a 'digital river,' new technologies will reveal and test the dynamics of the river through time, scoping new forms of representation to communicate prospects for more integrative and inclusive approaches to river management and restoration. Working with the Waimatā Catchment Project team[18] and Takiwā digital mapping,[19] and in conversation with colleagues at the Gump Research Station in Tahiti and the Rachel Carson Centre in Munich,[20] we will devise and test evidence-based ways of restoring the river with its inhabitants (human and non-human) to a state of ora (health, prosperity and well-being).

2B. OVERALL AIM OF THE RESEARCH

Given the gravity and urgency of current environmental challenges, 'blue skies' research must explore new ways of thinking and acting that bring the hope of positive socio-ecological change. In Aotearoa, where new legislation is bringing urgency to the task of restoring waterways, old habits of mind continue to split people from the environment and the disciplines from each other, fostering extractive, fragmented approaches in both knowledge generation and its application to management. This project will bring insights from mātauranga and wānanga together with a wide range of disciplines to produce innovative and engaged understandings of ki uta ki tai – the operation of rivers and their ecosystems from the mountains to the sea.[21]

In Te Ao Māori, rivers are relational knots/nodes/strands in a meshwork of whakapapa[22] that arises from exchanges between earth and sky, land and sea. In seeking to understand the life of the Waimatā River from its emergence to the arrival of the first people from island Polynesia, and later from Europe and elsewhere, this project will examine the impacts of different human activities on the river community and explore the current state of this complex system, and how best to restore it to a state of ora. Unlike current ecosystem-based management, which often excludes parts of these systems, this understanding of a river system acknowledges the relations between the atmosphere, surface water and groundwater, vegetation cover, land use, water quality and quantity, the sea, plants, animals, micro-organisms and people. A Multiple Knowledges Framing[23] will underpin new ways of working with rivers in a revitalising ethos, interweaving different perspectives and lines of evidence in ways that allow a river system to 'speak for itself,' maximizing possibilities for the river to self-heal.

Such thinking is **radically local**, linking particular groups of people with particular mountains, rivers, and the ocean. Creative micro-adaptation to local conditions is vital if such socio-ecological experiments are to succeed. It is **radically holistic**, recognising that deep divisions between the natural and social sciences and among the different disciplines are non-adaptive in dealing with complex socio-ecological challenges; and working across different knowledge systems as well as a range of disciplines to understand the full complexity of a river community over time. At the same time, it is **hopeful**,[24] providing a relational framework based on ideas of whaiora (seeking ora) and tiakitanga (taking care) for actions that support the wellbeing of other life forms. It is also **timely**. In a world stricken by Covid-19, where many are calling for a fundamental reframing of human relations with other life forms and living systems, Aotearoa New Zealand with its diverse landscapes, unique indigenous biota, and rich if recent human history provides an exceptional opportunity for philosophical and practical socio-ecological experiments inspired by Māori ways of thinking about whaiora (regenerative ways of living) as well as cutting edge science.

***Objectives**:* In articles, a book and major invited lectures arising from our pilot project, team members have argued for a radical reshaping of the scientific project, working across knowledge traditions as well as disciplinary silos to tackle existential challenges including climate change, losses of biodiversity, and the degradation of the sea and waterways. Building on these interventions, this project will follow different yet inextricably interlinked strands in the life of a particular river with its human and non-human inhabitants through space and time (wā), tracing their patterns of interconnection through a multi-knowledges, multi-lines of evidence approach, and 'letting the river speak' to detect sources of well-being (ora) and dysfunction (mate) and ways of letting the river system heal.

The LTRS research programme has four key objectives:
1. ***Let the River Speak****:* Listen to the voices of the river to trace its emergence through space and time (wā), and discern the current state of the river, including sources of flourishing (ora) and ill-health (mate) – for the river itself, and its plants, animals and people;
2. ***River Stories:*** Tell stories of the river community in images, artworks, workshops and writing, including the design, development and applications of a methodological approach to the conduct of a 'River Ethnography';
3. ***A Digital River****:* Co-creating a digital Waimatā that links remote sensing and in-river sensors with field measurements and observations, historical movements, ancestral place names and stories, surges of sediment and pollution, exploring differing representations of the river.
4. ***Let the River heal:*** Wai ora, te mana o te wai, mauri ora – what does a healthy, thriving Waimatā look like? Discover strategies that allow the river community to self-heal.

Scholarly impact*:*
Objective 1. Let the River Speak: Each river behaves differently. Rivers give life to the land, as nurseries for plants and animals, as irrigators and producers of kai, as dwelling places of taniwha (powerfyl guardians) and their mātauranga, as 'highways' for eels and fish, and for people and their goods, and as markers of memories, boundaries, connections, events and ancestors – indeed, as ancestors themselves. In Te Ao Māori (the Māori world), rivers are born from the primal relationship between Ranginui and Papatūānaku, from whom all life descends. Humans and rivers are connected with all other life forms and landscape elements in a complex web of whakapapa (genealogy). The rights and responsibilities between the different elements in the world are derived from these ancestral relationships.

A whakapapa framing allows us to weave together insights from mātauranga and a range of disciplines to explore complex interactions between different elements in river systems, human and non-human. In our pilot project, team members explored this approach in innovative analyses of the geomorphological 'rights of the river' and new approaches to rivers governance, for instance. This project will expand these relations and connections to investigate topics including links between river pollution and human health, forest ecology and new ways of working with river communities to restore them to a flourishing state.

Objective 2. River Stories: In Waitangi Tribunal reports[25] and submissions, and in works such as Geoff Park's *Nga Uruora: Groves of Life*[26] and David Young's *Woven by Water: Histories from the Whanganui River*,[27] mātauranga experts and other scholars have used story-telling to illuminate the life of particular Aotearoa waterways through time. These rich accounts often focus on ancestral relations with rivers, although some also include their non-human inhabitants, e.g. kākahi (freshwater mussels), koura (freshwater crayfish), tuna (eels), piharau (lampreys), inanga (whitebait), freshwater fishes, and riverside forests and birds.

The design and conduct of a 'river ethnography' will explore the Waimatā River as a community of water, plants and animals, tracing its life as the river carved its way through the land from the hills to the ocean, flooding valleys, plains and forests and later, human settlements, and serving as habitat and highway for eels, fish and people. We will share its stories in images (e.g. film, photographs, digital displays), art works, workshops with local people, especially children, and writing, including a richly illustrated book.

While this research draws inspiration from exercises in 'anthropology beyond the human,'[28] it is above all an exercise in collaborative scholarship across different knowledge traditions and disciplines,[29] based on Māori understandings of waterways and aimed at transformative outcomes for river communities. It will contribute to new ways of relating to waterways in legal framings and governance, land uses (including farming, forestry, horticulture, suburban and urban development), and everyday living and new ways of telling the river's stories.

Objective 3. A Digital River: New Zealand has a world-leading record in the development and application of new technologies to support river science and management.[30] Data limitations in linking virtual representations of rivers with field entities[31] make it hard to respect the diversity of each river system, however, and to monitor adjustments to its dynamic habitat. In light of such

limitations, it has been challenging to relate a technocentric perspective upon rivers with local and traditional knowledges in which rivers are living systems.

Recent toolkit developments in the creation of a 'digital river'[32] are reframing these prospects, enabling the long-term goal to "make riverscapes real".[33] It is one thing to have such a resource, however, and quite another to contemplate its meaning and use. In developing a digital waterway, the team will align river-centric representations with socio-cultural relations, tracing the history of the river community, contextualising assertions of river rights[34] and refashioning dynamic understandings of river health, allowing the river to speak for itself and thrive.[35]

Objective 4: Let the River Heal: Working with geo-ecological recovery is a core foundation of precautionary, proactive and cost-effective approaches to river management.[36] As yet, such scientific framings have not been conceptualized within a socio-cultural lens – healthy rivers, healthy communities. Here we propose a fundamental shift in ways of living with rivers, an interwoven path to river recovery inspired by and through mātauranga.[37] This project explores how to envisage and enact this reframing of perspectives, framed within a 'self-healing' lens – what's good for the river is good for its people, and vice versa.

In geo-ecological terms, a conscious choice to stand back and allow the river to look after itself, sometimes called 'passive restoration,' has become de rigeur. Whenever practicable, this entails 'giving space to the river', seeing the river as a corridor with 'freedom spaces' that allow the river to sort itself out.[38] Healthy parts of the river system are cared for, while pressures that threaten its well-being are investigated and strategically addressed.

In Te Ao Māori, rivers are seen as kin-based communities of land, water, plants, animals and people, whose well-being is inextricably entangled. As Whanganui River elders say, 'I am the river, and the river is me. If the river is dying, so am I.' This innovative relational approach also applies to the research itself, with researchers working closely with the river community and drawing on their insights and knowledge to co-design ways of restoring the river to ora (health).[39]

Knowledge gained from this research will enhance our understanding of the alignment between socio-cultural and biophysical approaches to the capacity for the Waimatā to self-heal – what this looks like, how we can maximize prospects to achieve this. If we succeed, these experiments may allow us to demonstrate world-leading capacity in river science and management in Aotearoa.

2C. PROPOSED RESEARCH

Objective 1. Let the River Speak: Drawing upon geology, geomorphology, ecology, microbiology, wānanga (ancestral whakapapa, narratives and tikanga), anthropology and history, we'll listen to the voices of the Waimatā River to discover how this river community has changed through space and time (wā), and to discern the current state of the river, including sources of flourishing (ora) and ill-health (mate) – for the river itself, and its plants, animals and people. In our research, we'll follow a participatory approach based on established relationships between our team and members of the Waimatā River community, working with them to co-design the research process and outcomes.

AI Brierley will work with colleagues, graduate research assistants and honours students to investigate the flow and sediment regime of the Waimatā as an interconnected catchment system. He will consider the relationship between source-zone processes (forested hillslopes, wetland areas (i.e. relating process to anthropogenic land uses), the river conveyor belt (Waimatā as a flume) and interactions at the coastal interface, and investigate the Waimatā as a living system addressing ecosystem health, functionality and how local communities live with the river.

AI Walker will lead the research into ancestral landscapes along the Waimatā, gathering place names, maps, whakapapa and stories; and with **PI Hikuroa** and iwi researchers, into contemporary iwi (tribal) engagements with the river. **PI Salmond** and **AI Lythberg** will work in archives to investigate the life of the river in historical times, and with local researchers, businesses, residents and other community members to explore their insights into and aspirations for the river.

PI Salmond with **Graeme Atkins**, a tohunga taiao (ecological expert) will explore the hau (life) of the forests in the Waimatā catchment, drawing on mātauranga taiao (ancestral environmental knowledge) and forest ecology to examine interactions among different life forms in Waimatā River forests; while our collaborator **Ass. Prof. Wiles** will examine the microbiological life of the river and

its impact on human health and well-being, in research seeking generative alignment between scientists' and community aspirations and concerns.

Objective 2. River Stories: In narrating the life of the Waimatā River, we'll examine its traces in the land, through geology, geomorphology and technologies such as LIDAR, and in human memory through wānanga (Māori cosmological accounts), whakapapa (genealogies) and oral narratives, maps, documents and images. We will explore the contemporary life of the river through interviews, ecological research and methods such as drone filming, and share these stories through writing, artistic expression and workshops. A 'river ethnography' of the Waimatā led by **PI Salmond** will weave together stories about the life of the river in a richly illustrated book.

Objective 3. A Digital River*:* A digital revolution is transforming practice in river science and management.[40] This includes developments in Google Earth Engine (GEE) and related remote sensing platforms that measure water-quality and support catchment-wide analyses of landscape/river adjustment.[41] Systematic appraisals of which parts of landscape are adjusting are incorporated within 'living databases'. Accompanying tools seek to explain controls upon patterns and rates of change.[42] Intriguingly, data availability and emerging toolkits now support analyses of physical habitat availability and change along river courses (e.g. Williams et al., 2020). Used effectively, these developments can support efforts that allow each river to 'speak for itself'. But how do we go about this? Who gets to 'speak on behalf of the river'?

Recent availability of 1m resolution LIDAR data (since 2019) will transform understandings of landscape change and flow/sediment/wood flux in the Waimatā catchment. We will follow the River Styles Framework,[43] and related work that highlights the imperative for 'human interpretation' in analyses of 'digital rivers',[44], mapping changes in the Waimatā over the last 50 years; developing and applying an approach that incorporates bio-physical and socio-cultural measures of river health; and exploring the effects of potential interventions.

Approaches to river restoration to date have been shackled by disciplinary boundaries. The Digital River will provide a dynamic template for linking society with river as a living entity, in the search for well-being.

The team led by A**I Brierley** and **PI Hikuroa** will relate these representations of a digital river with field insights and local/traditional knowledges, facilitating and participating in a creative and generative process of sharing, interweaving different ways of knowing and living with rivers.

PhD candidate Kerekere will use data, knowledge and insights from the digital river and explore river stories differently, using digital projection mapping onto the Waimatā, and deploying the environment as a projection substrate to bring stories, scientific data and art alive.

Objective 4. Let the River Heal: Rivers are emergent entities, driven by disturbance and adjusting to create their own dynamics and evolutionary traits. What does a river-centric framing look like, and how does it work? How can we learn to stand back and let the river be? Such questions lie at the heart of concerns for agency and power as we support efforts to allow the Earth (and its rivers) to self-heal.[45]

In our preliminary research on the Waimatā River, challenges to the well-being of the river arising from human interventions were identified, including large-scale removal of indigenous forest with severe losses of biodiversity, flooding and erosion; forestry management practices that discharge sediment and slash into the river; farm management practices that contribute to erosion and the deposition of rubbish and nitrates in the river; downstream aggradation of the river base, putting at risk paddling and rowing on the river; the discharge of wastewater contaminated with sewage into the river, threatening the health of paddlers, rowers and swimmers; and flooding that threatens riverside properties both public and private, and infrastructure including roads, parks and bridges.

'Enhanced recovery' measures will build upon the analyses described above, and draw on ideas of kai-tiakitanga (guardianship) and tuku (gift exchange) to begin with those parts of the river in which recovery has already started, targeting parts of the system where small interventions can make a big difference, and fostering approaches in which different parts of the river community (e.g. forests and people, town and country, adults and children, iwi and other community members, businesses, Council and residents) work together to let the river heal.

2D. VISION MĀTAURANGA

This project draws from Mātauranga Māori in the areas of Indigenous Innovation (economic sustainability), Taiao (environmental sustainability), Hauora/Oranga (health and social wellbeing) as well as Mātauranga Indigenous Knowledge more broadly. It addresses distinctive Māori concerns and aspirations regarding rivers and the Waimatā in particular, recognizing and empowering Māori river users, experts and knowledge systems in the research. The Waimatā River is special to Ngāti Porou, Rongowhakaata, Te Aitanga-ā-Māhaki and Te Aitanga-ā-Hauiti – an entity to be valued, treasured, and respected, and inseparable from these iwi and their ancestors.

Inspired by a whakapapa-based relational worldview that regards rivers as "an indivisible and living whole, from the mountains to the sea, incorporating all its physical and meta-physical elements", this collaborative project will be delivered by a team with relationships already *in* place, as well as *with* place in the Waimatā catchment.

Consultation for *Let the River Speak* (*LTRS*) builds on the pilot project *Te Awaroa – Voice of the River* projects, led by the same PIs. The *LTRS* team includes AI Walton Walker (Ngāti Rangi, Te Whānau-a-Takimoana, Te Whānau-a-Iritekura and Te Whānau-a-Rakaihoea), a highly esteemed wānanga expert who writes about local landscapes and ancestral knowledge. As Senior Māori Engagement Officer for Gisborne District Council (GDC) and Chair of the Horouta Waka Ama club, Walker is closely engaged with the life of the Waimatā. He will co-ordinate our work with the waka ama community, and with local iwi and iwi river researchers, including Ian Ruru (Te Aitanga-ā-Māhaki), Murray Palmer (who works with Rongowhakaata) and Graeme Atkins (Ngāti Porou). The project will also support Kaaterina Kerekere (Te Aitanga-a-Hauiti, Rongowhakaata) towards a PhD with a Toi Māori/creative practice component exploring the restoring and restorying of Waimatā – the river she grew up in, swimming and paddling waka. Ian Ruru and Murray Palmer are both members of the Kiwa Group (Ian is the Chair), which provides expert cultural and technical advice to GDC relating to research, planning and delivery of projects that aim to improve the mauri of waterways in Tūranganui a Kiwa (Gisborne).

University of Auckland team members have long-standing relationships with and within Tairāwhiti. PI Anne Salmond grew up in Tūranganui, chairs the Waikereru Ecosanctuary in the catchment, and has close kin relations with local iwi. PI Dan Hikuroa (Ngāti Maniapoto, Tainui, Te Arawa) works closely with Ian Ruru and Murray Palmer, frequently visiting Tūranganui as part of the Te Awaroa team. AI Gary Brierley, another key member of the *Te Awaroa* team, regularly brings senior students to conduct research on the Waimatā and other Tairāwhiti rivers. AI Billie Lythberg has worked for a decade with Te Aitanga a Hauiti, who have strong relations with the upper Waimatā catchment. Their Vision Mātauranga framework is based on activating ancestral Hauiti – and more generally Māori – knowledge in contemporary situations, including cultural and environmental revitalisation.

Contributing to Mātauranga Māori legal framings, PI Dan Hikuroa is a member of Ngā Kaihautū Tikanga Taiao (Statutory Māori Advisory to the Environmental Protection Authority), and key member of the Mātauranga Programme team building a framework to test the veracity of mātauranga as evidence; while PI Anne Salmond is a member of Te Ao Māori reference group for the Resource Management System Reform, advising on waterways governance.

The project will take a Kaupapa Māori participatory action approach, with a vision and plans co-designed with the communities and organisations involved. Our preliminary research began with in-depth interviews, empowering community members to speak their minds about issues relating to the river; proceeded to written reports that shared their views, knowledge and insights, circulated with their consent; followed by feedback sessions in key community locations in which different topics relating to the river were discussed and debated. In this project, hui will be held in various localities, and vary in participation from select invited guests, to broad, wider/whole of community wānanga. We will undertake hīkoi walks throughout the catchment, tracing waterways, and sharing pūrākau (stories derived from mātauranga) and kōrero (general discussion and further stories) in wānanga, artistic expression, and festival and community events.

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Blue, C. Sunde, J. Tunnicliffe and **A. Salmond,** 2018. A geomorphic perspective on the rights of the river in Aotearoa New Zealand. *River Research and Applications* 1-12; **Salmond, A.,** 2018. Rivers as Ancestors and other Realities: Governance of Waterways in Aotearoa New Zealand, in eds. Linda Te Aho, Maria Humphries, Betsan Martin, *ResponsAbility, Law and Governance for Living Well with the Earth*, Routledge, 183-192.

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2F. TIMETABLE

This is a three-year project. We will convene full team meetings every three months, either in Auckland or Tairāwhiti, and maintain regular contact via email, Zoom online meetings and further face-to-face meetings whenever possible.

Year 1, 1 March 2021–28 February 2022: Objectives are to obtain UoA ethics approval, undertake preliminary discussions with iwi researchers and advisors, and commence work across all four project objectives. In particular, archival research begins towards the 'river ethnography', working in institutional and private archives and interviewing 'living archives' including local researchers, businesses, residents and other community members; while Digital River milestones focus on the generation of the Digital Waimata. An RA at PhD level will work alongside AI Brierley, and the first MSc project will commence, on sediment flux modelling scenarios based on Digital Waimata investigations. Testing of river water will commence, in a project that will unfold organically across the project extent under the direction of Ass. Prof. Wiles. By the end of Year 1, the first MSc project is nearing completion; the project's PhD scholar has enrolled and commenced research; community direction for river health and testing is established; and 'river stories' are being heard via hui, seminars, conferences, and other appropriate avenues.

Year 2, 1 March 2022–29 February 2023: Work begins on 'translating' the Digital Waimata, with continued support from an RA funded at PhD level. The second MSc project begins, focused on 'Representations of a Digital Waimata', relating this to other connections to, and knowledges of, the river. Interviews continue, interview transcriptions are analysed, and findings to date are presented at hui, UoA seminars and appropriate conferences. Formal dissemination begins via journal papers: one per PI and AI (potentially co-authored with non-UoA project participants) by year's end. By the end of Year 2, papers are submitted to appropriate journals; the river ethnography chapter outline is prepared and a book contract negotiated with a reputable publisher; the first MSc is completed; our PhD scholar has completed her provisional year requirements; and the second MSc project is nearing completion.

Year 3, 1 March 2023–28 February 2024: Characterised by a shared commitment to a process of weaving the methodological framing of our project to generate final outputs and serve the project's 4 objectives. Findings to date continue to be presented at hui, UoA seminars, and dissemination continues via submission of journal papers by PIs and AIs, and conference presentations. By the end of year thee, the digital river is delivered. Draft chapters of the river ethnography book are circulated, debated and revised; full manuscript delivered to publishers February 2024. Masters theses are submitted.

Beyond 29 February 2024: Publication of river ethnography; completion of PhD and associated exhibition; assessment of social outcomes.

2G. ROLES AND RESOURCES

All team members from The University of Auckland are research active academics with dedicated allowances for research within their contracts. The FTEs sought here will add to these time allocations and boost their availability for the project. Each will also receive personal research development funds as a percentage of their project salary costs, which will be used to support their research. Research and Study leave will further extend the availability of **AI Brierley** (semester 2, 2021) and **PI Hikuroa** (dates TBC).

This project requires a wide range of collaborations across disciplines and with the Waimatā River restoration project. The two PIs have complementary disciplinary backgrounds, and each has worked closely with mātauranga experts. As an anthropologist, **PI Salmond** is trained to study human life, past and present, while as an earth systems scientist **PI Hikuroa** is trained to study the earth itself as a set of interconnected systems. We will work closely together and with the rest of the research team to investigate different aspects of the life of the Waimatā, to weave together different disciplines and ways of knowing to reach new understandings, and to share these insights with the Waimatā River project and communities.

In particular, **PI Salmond** will work with Ngāti Porou taiao expert **Graeme Atkins** and other researchers including botanists, forest ecologists and paleo-ecologists on the life of forests around the Waimatā; and co-ordinate the relationships between the research team, the Waimatā

restoration project, and the wider Gisborne community. She will produce articles on the hau of the forest and with Lythberg and Walker, work with researchers beyond the project team to bring together a richly illustrated narrative about the Waimatā as a living community, from its first emergence with its plants and animals to the arrival of people, and its current state and possible futures.

PI Hikuroa (Ngāti Maniapoto, Tainui, Te Arawa) will work with **AI Brierley** on the underlying geology of the Waimatā River system; microbiologist **Ass. Prof Wiles** on human health and the river; **Ian Ruru** and **Murray Palmer** on freshwater and marine ecosystems (e.g. tuna, koura) and the mauri compass; and with **AI Walker** and the waka ama community in Gisborne on the current state of the river. He will contribute to the river ethnography and produce articles on how life in the river itself is entangled with the life of iwi and wider river communities, and how mātauranga Māori can enrich understandings of complex ecological systems.

AI Walton Walker (Ngāti Rangi, Te Whānau-a-Takimoana, Te Whānau-a-Iritekura and Te Whānau-a-Rakaihoea) is a highly respected wānanga expert who writes about local landscapes and ancestral knowledge. As Senior Māori Engagement Officer for Gisborne District Council and Chair of the Horouta Waka Ama club, he is closely engaged with the life of the Waimatā. He will research the Māori history of the Waimatā and co-ordinate our work with the waka ama community, and with local iwi and iwi river researchers, including **Ian Ruru** (Te Aitanga-ā-Māhaki), **Murray Palmer** (who works with Rongowhakaata) and **Graeme Atkins** (Ngāti Porou). The project will also support **Kaaterina Kerekere** (Te Aitanga-a-Hauiti, Rongowhakaata), towards a PhD with a creative practice component exploring the restoring and restorying of local landscape; two MSc scholarship students; and 'summer students' will be recruited each year.

AI Brierley, a global expert on river systems and their restoration, will work with colleagues, graduate research assistants and honours students to investigate the flow and sediment regime of the Waimatā in an interconnected catchment system. He will consider the relationship between source-zone processes (forested hillslopes, wetland areas (i.e. relating process to anthropogenic land uses), the river conveyor belt (Waimatā as a flume) and interactions at the coastal interface, and investigate the Waimatā as a living system addressing ecosystem health, functionality and how local communities live with the river. AI Brierley will contribute to the river ethnography and produce articles about new approaches to working with waterways.

AI Lythberg has previously worked on river health and economics in relation to industry pollution prevention planning. Building on long-standing working relationships in Tairāwhiti, she will work with iwi partners, Gisborne District Council and local businesses. Her research will aim to propose ways for businesses to support the revitalisation of the Waimatā, recognising its economic and other values. She will write journal articles, contribute to the river ethnography through an economic lens, and manage the day to day logistics of the project and team.

Associate Professor Siouxsie Wiles will examine the microbiological life of the river and its impact on human health and well-being, in a project designed to meet the aspirations of community. Confirming her availability to join the project after the EOI was submitted (due to commitments to NZ's Covid-19 response), Wiles was unable to be classified as an AI, but will play a vital role in the project's community science development, delivery and communication.

Resources: The University of Auckland will provide office and library facilities. The project has the formal backing of Gisborne District Council and Department of Conservation, with access to their mapping systems (including Lidar) and records of the catchment. We are requesting funds to support iwi collaborators; for research assistants and graduate student scholarships; for travel between Auckland and Tairāwhiti, and to overseas conferences as and when such travel becomes feasible. We anticipate supporting applications for further funding, made by other researchers, iwi and community members, towards complementary projects and kaupapa as they emerge.

2H. ETHICAL OR REGULATORY OBLIGATIONS

We will apply for Ethics approval(s) from The University of Auckland Human Subjects Ethics Committee. The project has the formal backing of Gisborne District Council and DoC. Iwi consultations are underway and based on previous experience working in this rohe.

Proposal	Contact PI's Surname	Initials	Application Number	Panel
Standard	Salmond	A	20-UOA-260	SOC

3. VISION MĀTAURANGA

Please identify which, if any, of the four Vision Mātauranga themes can be associated with your research. Tick as many as appropriate. If none apply, tick N/A.

Vision Mātauranga themes and percent contribution to the proposed research.

The total for all themes ticked can exceed 100%

Indigenous Innovation (economic sustainability)	✓	20%
Taiao (environmental sustainability)	✓	40%
Hauora/Oranga (health and social wellbeing)	✓	20%
Mātauranga (indigenous knowledge)	✓	20%

N/A

A brief rationale for your choice(s):

This research draws from, and adds to, a distinctive mātauranga knowledge base. It addresses distinctive Māori concerns and desires regarding freshwater expressed in the Kahui Wai Māori – Te Mana o te Wai Report last April.

5. CURRICULUM VITAE, PUBLICATIONS AND OTHER PUBLISHED WORKS

PART 1

1a. Personal details				
Full name	*Title* Dame	*First name* Anne	*Second name(s)*	*Family name* Salmond
Present position	Distinguished Professor in Maori Studies & Anthropology			
Organisation/Employer	University of Auckland			
Contact Address	16 Wynyard St,			
	Auckland			
			Post code	1010
Work telephone		**Mobile**	021424545	
Email	a.salmond@auckland.ac.nz			

1b. Academic qualifications

1972 PhD (Anthropology) University of Pennsylvania
1968 MA 1st class (Anthropology), University of Auckland

1c. Professional positions held

2001– Distinguished Professor, University of Auckland
1997–2006 Pro Vice Chancellor (Equal Opportunity), University of Auckland
1992– Personal Chair in Social Anthropology & Maori Studies, University of Auckland

1d. Present research/professional speciality

My research draws inspiration and insights from engagements across 'worlds' and philosophical traditions in New Zealand, the Pacific and Europe. This work spans a range of disciplines—mainly anthropology, but also history, Maori Studies, Pacific Studies, linguistics, history and philosophy of science, and the environmental sciences.

Key areas of interest include Maori and Pacific philosophies and ways of living, past and present; Enlightenment science and philosophies, and their Pacific legacies; experimental futures emerging out of the exchanges between these philosophies and cutting edge science; exploration and voyaging; environmental issues and ecological restoration.

1e. Total years research experience	54 years

1f. Professional distinctions and memberships (including honours, prizes, scholarships, boards or governance roles, etc)

2020: Invited member of Te Ao Māori advisory group for reform of the Resource Management Act
2019: Final Kosmos Lecture, Alexander von Humboldt Foundation, Germany Sir Raymond Firth Memorial Lecture, UK
Co-chair with Wayne Ngata, Te Paepae o Tangaroa symposium.
2018: Friedrich von Siemens Research Prize by the Alexander von Humboldt Foundation, in recognition of life-time achievements in research.
Finalist, Al-Rhodhan prize for Global Cultural Understanding, British Academy, for *Tears of Rangi*
Finalist, Ockham Book Awards, non-fiction, for *Tears of Rangi.*

2016–8: Vice-President (Social Sciences and Humanities) Royal Society of New Zealand
2016–2019 Principal Investigator, Marsden Fund grant: *Te Ao Hou: Imagining New Worlds in New Zealand*
2015: Fellow of American Philosophical Society
2015–**present:** Patron and co-leader, Te Awaroa: 1000 Rivers Foundation.
2014–2019: Principal Investigator Strategic Research Investment Fund grant, UOA, 'Te Awaroa: Restoring New Zealand Rivers.' Also funded by the NEXT Foundation and the Tindall Foundation.
2014–present: Member, Air New Zealand Sustainability Advisory Panel
2013: Rutherford Medal, Royal Society of New Zealand
Kiwibank New Zealander of the Year
Cecil H. and Ida Green Visiting Professor at the University of British Columbia, Canada
Hood Travelling Fellowship, University of Auckland 2013-present, Patron, Great Barrier Island Society.
2012: Rockefeller Foundation Fellowship (Bellagio, Italy)
Finalist, Le Prix Gens de Mer for *Aphrodite 's Island* (French translation)
Finalist, New Zealand Post Book Awards, non-fiction, for *Bligh*
Member [2012-7], World War I Panel, NZ Government
2011: KEA World Class New Zealander - Science, Technology and Academia Award
Patron [2011-], Historic Places Aotearoa
2010: 2010-14, Principal Investigator, Marsden Fund grant: *Te Ao Tawhito: The Ancient Maori World*
Finalist, NZ Post Book Awards (non-fiction), for *Aphrodite's Island*
Member [2010-12], Archives Council, NZ Government
2009: Foreign Associate, National Academy of Sciences, US [1st New Zealander to become a fellow of both NAS and British Academy]
2009–present Chair and co-founder, Longbush Ecological Trust, Waikereru Ecosanctuary
2008: Corresponding Fellow, British Academy, UK 2007: Montana Prize for History for *Vaka Moana* [contributing author];
Founding Fellow, New Zealand Academy of the Humanities
2007–present: Member, Advisory Group, World Heritage nomination for Taputapuatea Marae, Ra'iatea, Society Islands
2006: Visiting Professor, École des Haute Études, France
2004: Prime Minister's Award for Literary Achievement
Caird Fellow, National Maritime Museum, Greenwich, United Kingdom
Montana Prize (History): *The Trial of the Cannibal Dog: Captain Cook in the South* Seas
Montana Medal for Non-Fiction for *The Trial of the Cannibal Dog*
2004–present: Patron, American Field Service
2004–2011: Co-leader with Professor Serge Tcherkezoff of CREDO Research Centre, Marseilles, Pacific Fund grant from the French government
2003–present: Patron, Whinray Ecological Trust, Gisborne
2003–2007: Principal Investigator, Marsden Fund grant: *Cross-cultural voyaging in the Pacific*
2003–present: Project Sponsor, Starpath Partnership for Excellence
2002–2008: Chairperson, Board of the New Zealand Historic Places Trust
2000–2003: Principal Investigator, Marsden Fund grant, *Between Worlds*

1g. Total number of *peer reviewed* publications and patents	Journal articles	Books	Book chapters, books edited	Conference proceedings	Patents
	21	11	35	N/A	N/A

PART 2

2a. Research publications and dissemination

Peer-reviewed journal articles

2020 (in press) Entangled Worlds. Final Kosmos Lecture. *Erde*, Berlin, Berlin Geographical Society.

(in press) Star Canoes, Voyaging Worlds, in ed. Geoffrey E.R. Lloyd and Aperecida Vilaca, Science in the Forest, Science in the Past, special issue *Interdisciplinary Science Review* 46/1.

(in press). Epilogue: 'I am the river,' Epilogue. In ed. Eveline Duerr and Philipp Schorch, Experiencing Pacific Environments: Pasts, Presents, Futures, special issue, *The Contemporary Pacific* 31/1.

2019 with Gary Brierley and Dan Hikuroa, Let the Rivers Speak: Thinking about Waterways in Aotearoa New Zealand, in ed. Joy, Mike, *Policy Quarterly,* 15/3, 45-54.

2019 Hidden Hazards: Reconstructing Tupaia's Chart. Forum on Tupaia's Chart, *Journal of Pacific History*, https://doi.org/10.1080/00223344.2019.1651466.

2019 with Billie Lythberg, Spiralling Histories: Reflections on the 1923 Dominion Museum East Coast Ethnological Expedition, and other Multimedia Experiments, in *Journal of the Polynesian Society* 128/1, 43-63.

2019 What is Anthropology? British Academy www.thebritishacademy.ac.uk/blog/what-is-anthropology.

2018 A Geomorphic Perspective on the Rights of the River in Aotearoa New Zealand, with Gary Brierley, Marc Tadaki, Dan Hikuroa, Brendon Blue, Charlotte Sunde, Jon Tunnicliffe. *River Research Applications,* 1-12.

2016 Marine Reserves: Sustainable Fisheries need Reserves; with Mark Costello, Dan Hikuroa and Sue Taiei, *Nature* **540**(7633):341 December 2016.

2014 Tears of Rangi: People, Water and Power in New Zealand. *Hau: Journal of Ethnographic Theory* 4 (3): 285–309

2012 Ontological Quarrels: Indigeneity, Exclusion and Citizenship in a Relational World. *Anthropological Theory* 12: 115-141

2012 Back to the Future: First Encounters in Te Tai Rawhiti. Special Issue, Transit of Venus, *Journal of the Royal Society of New Zealand* 42/2, 69-77

2010 with Salmond, Amiria. Artefacts of Encounter. *Interdisciplinary Science Reviews: History and Human Nature* 3-4, 302-317.

2005 Their Body is Different, Our Body is Different: European and Tahitian Navigators in the Eighteenth Century. *History and Anthropology,* 16/2:167-186;

1989 Tribal Words, Tribal Worlds: The Translatability of Tapu and Mana. In ed. M. Marshall and J.L. Caughey, eds., *Culture, Kin and Cognition*, American Anthropological Association Special Publications Scholarly Series, 55-78

1986 Towards a Local Anthropology. *Sites* 13, 39-48

1983 The Study of Traditional Maori Society: The State of the Art, *Journal of the Polynesian Society*, 92/3, 309-331.

1978 Te Ao Tawhito: A Semantic Approach to the Traditional Maori Cosmos, *Journal of the Polynesian Society*, 87/1, 5-28.

Peer reviewed books

2017: *Tears of Rangi: Experiments across Worlds.* Auckland, Auckland University Press.
2011: *Bligh: William Bligh in the South Seas.* Berkeley, University of California Press; Auckland, Penguin NZ.
2009: *Aphrodite's Island: The European Discovery of Tahiti.* Berkeley, University of California Press; Auckland, Penguin NZ.
2003: *The Trial of the Cannibal Dog: Captain Cook in the South Seas*. London, Penguin UK; New Haven, Auckland, Penguin NZ.
1997: *Between Worlds: Early Exchanges between Maori and Europeans 1773-1815.* Honolulu, University of Hawaii Press; Auckland and London, Viking Press
1991: *Two Worlds: First Meetings Between Maori and Europeans 1692-1772.* Honolulu, University of Hawaii Press; Auckland and London, Viking Press
1980: *Eruera: The Teachings of a Maori Elder*. Wellington, A.H. & A.W. Reed.
1976: *Amiria: The Life Story of a Maori Woman*. Wellington, A.H. & A.W. Reed.
1975: *Hui: A Study of Maori Ceremonial Gatherings*. Wellington, A.H. & A.W. Reed.

Peer reviewed book chapters, books edited

2020 (in press) Restoring socio-cultural relationships with rivers: experiments in fluvial pluralism from Aotearoa New Zealand, with Dan Hikuroa, Gary Brierley, Brendan Blue and Marc Tadaki. In: Cottet, M., Morandi, B. and Piegay, H. (Editors), *River Restoration: Social and Policy Perspectives from Practice and Research* (Wiley, Chichester, UK).
2018 Lifeblood of the Land: Rights, Responsibilities and the governance of waterways in New Zealand. eds. Linda Te Aho, Maria Humphries, Betsan Martin in *ResponsAbility, Law and Governance for Living Well with the Earth*, Routledge, 183-192.
2018 Reimagining the Ocean, in ed. Nicholas Thomas. *Oceania* (Royal Academy of Arts, UK), 42-55.
2018 Afterword, Think like a Fish: Pacific Philosophies and Climate Change, in eds. Tony Crook and Peter Rudiak-Gould. *Pacific Climate Cultures: Living Climate Change in Oceania* (De Gruyter Open Press),155-159.
2018 Can we learn to live with our World? *The Big Questions: What is New Zealand's Future?* (Penguin Books, Auckland), 278-294..
2018 Reimagining the Ocean, in ed. Nicholas Thomas. *Oceania*. Royal Academy of Arts, UK, 42-55.
2017 Voyaging Worlds, *Lisa Reihana Emissaries* (Venice, La Biennale di Venezia), 42-65.
2015 The Fountain of Fish: Ontological Collisions at Sea. In eds. Silke Helfrich and David Bollier, *Patterns of Commoning*
2015 Introduction, *Lisa Reihana: In Pursuit of Venus* (infected) (Auckland, Auckland Art Gallery), 1-3.
2015 Et la tête: Casting Heads in the Pacific. In eds. Kriselle Baker and Elizabeth Rankin, *Falling in Light: Fiona Pardington* (Dunedin, University of Otago Press), 133-136.
2006 Ancestral Places. In ed. Kynan Gentry and Gavin McLean, *Heartlands: New Zealand Historians write about where history happened*. Auckland, Penguin Books, 135-144
2006 Two Worlds. In ed. K.R. Howe. *Vaka Moana: Voyages of the Ancestors.* Auckland, David Bateman and Auckland Museum, 246-269.
1998 Maori and Modernity: Ruatara's Dying. In ed. A. P. Cohen, *Signifying Identities Anthropological Perspectives on Boundaries and Contested Values*. Edinburgh, University of Edinburgh, 37-58.
1995 Self and Other in Contemporary Social Anthropology. In ed. Richard Fardon,

Counterworks: Managing the Diversity of Knowledge. London, Routledge, 23-48.

1991 Tipuna: Ancestors: Aspects of Maori Cognatic Descent. In ed. A.Pawley, *Man and a Half: Essays in Pacific Anthropology and Ethnobiology in Honour of Ralph Bulmer.* Auckland, Polynesian Society, 343-356.

1989 Tribal Words, Tribal Worlds : The Translatability of Tapu and Mana, in ed. M. Marshall and J.L. Caughey*,* eds., *Culture, Kin and Cognition*, American Anthropological Association Special Publications Scholarly Series 23 (American Anthropological Association), 55-78.

1985 Maori Epistemologies. In *Reason and Morality*, ed. J. Overing, ASA Monograph Series No.24. London, Tavistock, 240-263

1984 Pathways in the Maori World, in ed. Hirini Mead, *Te Maori : Maori Art from New Zealand Collections* (Auckland, Heinemann), 109-137.

1983 Theoretical Landscapes: on Cross-cultural Conceptions of Knowledge, in ed. David Parkin, *Semantic Anthropology*, ASA Monograph Series No.22, (London, Academic Press), 65-87.

Other forms of dissemination (reports for clients, technical reports, popular press, etc)

2020 Artefact 2 – host for 4 episode documentary, Prime, Maori TV and NZ on Air.

2018 Artefact – host for 6 episode documentary, Maori TV and NZ on Air, aired 2018

2011 *The Scotsman and the Maori* – documentary on the Dominion Museum expeditions for Maori TV by Libby Hakaraia and Tainui Stephens, featuring Anne and Amiria Salmond as descendants of the film maker and photographer James McDonald, and descendants of those met by the expedition teams in Maori communities around New Zealand

2010a Brief of Evidence of Distinguished Professor Dame Anne Salmond, *Te Tiriti o Waitangi /The Treaty of Waitangi*. WAI 1040, #A22, for the Waitangi Tribunal.

1992 *Māori Understandings of the Treaty of Waitangi*, F19, for the Waitangi Tribunal, Muriwhenua Land Claim.

1991 *Likely Maori understanding of Tuku and Hoko,* Wai 45, for the Waitangi Tribunal, D17

5. CURRICULUM VITAE, PUBLICATIONS AND OTHER PUBLISHED WORKS

PART 1

1a. Personal details				
Full name	Dr	Daniel	Carl Henare	Hikuroa

Present position	Senior Lecturer			
Organisation/Employer	Te Wānanga o Waipapa, University of Auckland			
Contact Address	University of Auckland			
	Private Bag 92019			
	Auckland		**Post code**	1142
Work telephone	09 9239026	**Mobile**	0212469999	
Email	d.hikuroa@auckland.ac.nz			

1b. Academic qualifications

2005 PhD, Geology, University of Auckland
1996 BSc, Geology, University of Auckland

1c. Professional positions held

2017-present Senior Lecturer, Māori Studies, University of Auckland
2016-2017 Senior Lecturer, Anthropology, University of Auckland
2011-2016 Research Director, Ngā Pae o te Māramatanga
2008-2011 Community Earth Systems Science Programmes Manager, Institute of Earth Science & Engineering, University of Auckland
2005-2007 Post Doctoral Fellow, School of Geography, Geology, Environmental Science, University of Auckland
2003-2005 Senior Lecturer, Te Whare Wananga o Awanuiarangi, Whakatane

1d. Present research/professional speciality

For many years mātauranga Māori had been considered incompatible with science, mainly because of the inclusion of holistic and spiritual components in the former. After training as a Geologist, I now practice Earth Systems Science, predominantly on community driven and participatory projects including: marine spatial planning; environmental management plans; natural resource use and management; natural hazards, disaster risk reduction, resilience; and industrial waste-site rehabilitation.

Specialties: Integrating Mātauranga Māori with science; Earth Systems Science; Natural Hazards & Disasters; Decision-Making Frameworks; Geothermal Geology; Coastal Geomorphology; Economy and Innovation.

The key question of my research is: What can the weaving of Mātauranga and Science contribute to our understanding? The methods I employ are consistent with Kaupapa Māori paradigm, method and methodology, and I have worked primarily with Māori communities to realize their dreams and help solve their issues. My present research projects include: Te Awaroa – Voice of the River & Indigenous Theory of Value (Ngā Pae o te Māramatanga); Blue Economy & Whai Rawa, Whai Mana, Whai Oranga (Sustainable Seas), Marae Resilience & Role of Mātauranga in Disaster Resilience (Resilience to Natures Challenges), Māori and the Extractive Industries & (MBIE), Kaitiakitanga and Conservation (Te Pūnaha Matatini).

I assisted the Environmental Defence Society with their NZ Law Society funded project that re-imagined the Resource Management Act.

1e. Total years research experience	15 years

1f. Professional distinctions and memberships (including honours, prizes, scholarships, boards or governance roles, etc)

2020, **Appointed** UNESCO New Zealand Commissioner for Culture

2020, **Invited Presentation** at Australian and New Zealand Council for the Care of Animals in Research and Teaching Conference (July 2021)
2020, **Invited Keynote** 10th International Conference on Advanced Materials & Nanotechnology (February 2021)
2019, **Invited Presentation** American Geophysical Union Conference, Union session: I2TK: Intergenerational, Intercultural Transfer of Knowledge -- Diversity and Inclusion in Research, Education and the Science of Storytelling, San Francisco (December)
2019, **Invited Keynote** at Australasian Society for Risk Analysis 'Risk and decision-making' Conference, Wellington (November)
2019, **Invited Presentation** at Te Paepae o Tangaroa, Moananui Symposium, Tuia 250, Gisborne (October).
2019, **Invited Keynote** at WasteMINZ Annual Conference, Hamilton (September)
2019, **Invited Keynote** New Zealand Sustainable Development Goals Summit, Auckland (September)
2019, **Invited Keynote** at Environmental Protection Authority 'Science Symposium', Wellington (July)
2019, **Invited Keynote** at 'Grounding Story' Environmental Humanities Conference, University of New England, Armidale, Sydney (February)
2018, **Invited talk** at American Geophysical Union Annual Conference, Washington DC (December)
2018, **Invited Keynote** at the Rivers Group Annual Conference, Massey University, Palmerston North, (November)
2018, **Appointed Steering Committee** of Stockholm University led International Water Workshop
2018, **Invited Plenary** speaker at Stockholm University for symposium launching their new Environmental Humanities programme (May)
2017, **Appointe**d to George Mason Centre for the Natural Environment Advisory Board, Faculty of Science, University of Auckland
2017, **Appointed** Principal Investigator, Te Pūnaha Matatini
2017, **Appointed** Board Member, Pūniu River Care Incorporated
2017, **Appointed** guest-editor, NZ Journal of Marine and Freshwater Research, Mātauranga Māori Special Issue
2016, **Appointed** Watercare Environmental Advisory Group
2016, Presented to the Environmental Protection Agency Board on how to integrate Mātauranga Māori and Science
2016, **Appointed** Nga Kaihautū Tikanga Taiao, Environmental Protection Agency
2016, **Appointed** Mātauranga Māori Advisor, Te Papa Tongarewa
2015, **Appointed** co-VM lead, Resilience to Natures Challenges, National Science Challenge
2015, **Invited opening Plenary** speaker at Finding New Zealand's Scientific Heritage Conference (November) Wellington
2014, **Invited Plenary Speaker** at 6th International Science in Society Conference, October 10-12, Vancouver, Canada
2014, **Invited member** of Independent Review Panel of the Sea Change: Tai Timu, Tai Pari, Marine Spatial Plan Hauraki Gulf; Mātauranga Māori & Science expert
2014, **Invited by Maniapoto Māori Trust Board** to join Waipa Awa Fishery Reference Group, co-wrote Maniapoto Fishery Plan

1g. Total number of *peer reviewed* publications and patents	Journal articles	Books, book chapters, books edited	Conference proceedings	Patents
	21	0, 9, 1	11	-

PART 2

2a. Research publications and dissemination

Peer-reviewed journal articles

Wilkinson C, **Hikuroa D**, Macfarlane AH, Hughes M W (2020) Mātauranga Māori in geomorphology: existing frameworks, case studies and recommendations for Earth scientists, Earth Surface Dynamics https://doi.org/10.5194/esurf-2020-5 (in press).

Jones D, Moko-Mead T, Gregory E, Ihaka-Mcleod H, **Hikuroa D** (2020) Weaving Mātauranga into environmental decision-making. *New Zealand Science Review* (in press).

Salmond A, Brierley G, **Hikuroa D** (2019) Let the Rivers speak: Thinking about waterways in Aotearoa-New Zealand. Policy Quarterly "Freshwater: New Zealand's 21st century challenge", 21(3), 45-54.

Le Heron E, Logie L, Allen W, Le Heron R, Blackett P, Davies K, Greenaway A, Glavovic B, **Hikuroa D** (2019) Diversity, contestation, participation in Aotearoa New Zealand's multi-use/user marine spaces. Marine Policy 106, 103536.

Clapcott J, Ataria J, Hepburn C, **Hikuroa** D, Jackson A, Kirikiri R, Williams E (2018) Mātauranga Māori: shaping marine and freshwater future. New Zealand Journal of Marine and Freshwater Research: Mātauranga Māori Special Issue, 52(4), 457-466.

Hikuroa D, Clark J, Olsen A, Camp, E (2018) Severed at the head; towards revitalising the mauri of Te Awa o te Atua, NZJ Marine and Freshwater Research, Mātauranga Māori Special Issue, 52:4, 643-656.

Brierley G, Tadaki M, **Hikuroa D**, Blue B, Šunde C, Tunnicliffe J, Salmond A (2018) A geomorphic perspective on the rights of the river in Aotearoa New Zealand. River Research Applications - Special Issue Paper, 1-12.

Hikuroa D (2017) Mātauranga Māori – the ūkaipō of knowledge in New Zealand. Journal of the Royal Society of New Zealand, Special Issue – History of Science in New Zealand, 47(1), 5-10.

Fa-aui T, Morgan K, **Hikuroa, D** (2017) Ensuring objectivity by applying the Mauri Model to assess the post-disaster affected environments of the 2011 MV Rena disaster in the Bay of Plenty, New Zealand. Ecological Indicators, 79, 228-246.

Peacock BC, **Hikuroa D**, Morgan TKK (2012) Watershed-scale prioritization of habitat restoration sites for non-point source pollution management. Ecological Engineering, 42, 174-182.

Hikuroa D, Slade AT, Gravley DM (2011) Implementing matauranga in a scientific paradigm: Restoring the mauri to Te Kete Poutama. MAI Review, June 2011 (3)

Hikuroa D, Morgan TKKB, Henare M, Durie M (2011) Integration of Indigenous Knowledge with Science. International Journal of Science in Society, 2 (2), 105-114.

Bull JM, Gravley DM, **Hikuroa D**, Costello D (2010) Assessing debris flows using LiDAR differencing: 18th May 2005 Matata event. Geomorphology, 124 (1-2), 75-84

Peer reviewed books, book chapters, books edited

Le Heron, E, Le Heron, R, Logie, J, Greenaway, A, Allen, W, Blackett, P, Davies, K, Glavovic, B, **Hikuroa, D** (2020) Participatory Processes as Twenty-First-Century Social Knowledge Technology, in Elspeth Probyn, Kate Johnston, Nancy Lee eds, Sustaining Seas: Oceanic Space and the Politics of Care. Rowman & Littlefield, Ch. 11, pp. 155-172.

Fleming J, Longnecker N, Salmon R, **Hikuroa D** (2020**)** Moving to participatory science and bicultural science communication in Aotearoa New Zealand, in Toss Gascoigne ed, *The emergence of modern science communication*, (in press).

Hikuroa D, Brierley G, Blue B, Tadaki M, Blue B, Salmond A (2020) Restoring socio-cultural relationships with rivers: experiments in fluvial pluralism from Aotearoa New Zealand, in *River Restoration: Social and Policy Perspectives from Practice and Research*, M Cottet, B Morandi & H Pievay (Eds), (in press).
Hikuroa, D (2019) Whatungarongaro te tangata, toitu te whenua, in Chris McDowall ed, *We Are Here* Atlas. Massey University Press, pp. 14-15.
Le Heron R, Blackett P, Logie J, **Hikuroa DCH**, Le Heron E, Greenaway A, Glavovic, B, Davies K, Allen W, Lundquist C (2018) 7 Participatory processes for implementation in Aotearoa New Zealand's multi-use/user marine spaces? Unacknowledged and unaddressed issues, in: P. Heidkamp, J. Morrissey (Eds.), Towards Coastal Resilience and Sustainability. Dynamics of Economic Spaces Series, Taylor and Francis, pp. 111–130
Hikuroa, DCH (2015) How permanent is home? From Zealandia to Aotearoa, in A. Ormond, & L. Nikora (Eds.), Homebook. Auckland. Nga Pae o te Maramatanga.

Refereed conference proceedings

Hikuroa D (2019) Te Mana o te Wai. ASLEC-ANZ Conference, Armidale, February.
Hikuroa D (2018) Listen to Hinemoana**.** European Society for Oceanists Conference, Cambridge, UK, December
Hikuroa D (2017) Te Awaroa – Voice of the River. European Society for Oceanists Conference, Munich, July
Hikuroa D (2013) What role can Indigenous Knowledge play in reducing risk and increasing resilience? International Geographical Union, Kyoto, Japan, August

Patents

Other forms of dissemination (reports for clients, technical reports, popular press, etc)

Te Heuheu L, **Hikuroa D**, Kohere K, May K, Johns H, Puke H, Doherty J (2020) Ngā Kaihautū Tikanga Taiao Report EEZ200011 re OMV Taranaki Limited.
Hikuroa, D (2019) Peer Review of FINAL DRAFT of National Climate Change Risk Assessment framework for Ministry of the Environment (July 2019).
Rout M, Reid J, Bodwitch H, Gillies A, Lythberg B, **Hikuroa D**, Mackey L, Awatere S, Mika J, Wiremu F, Rakena M, Davies K (2019) Māori Marine Economy Literature Review, for Tangaroa Research proramme: Whai rawa, whai mana, whai orange: Creating a world-leading Indigenous blue marine economy.
Hikuroa D (2019) Peer Review of DRAFT National Climate Change Risk Assessment framework for Ministry of the Environment (June 2019).
Te Heuheu L, **Hikuroa D**, Kohere K, May K, Johns H, Puke H, Doherty J (2019) Ngā Kaihautū Tikanga Taiao Report EEZ400011 re Ports of Auckland Limited.
Te Heuheu L, **Hikuroa D**, Kohere K, May K, Johns H, Puke H, Doherty J (2018) Ngā Kaihautū Tikanga Taiao Report EEZ200010 re OMV New Zealand Limited.
Te Heuheu L, **Hikuroa D**, Kohere K, May K, Johns H, Puke H, Doherty J (2018) Ngā Kaihautū Tikanga Taiao Report EEZ100016 re Tamarind Taranaki Limited.
Te Heuheu L, **Hikuroa D**, Kohere K, May K, Johns H, Puke H, Doherty J (2018) Ngā Kaihautū Tikanga Taiao Report EEZ100015 re Costal Resources Limited.
Hikuroa D (2018) Te Awaroa - https://www.newsroom.co.nz/@future-learning/2018/10/01/260029/another-approach-to-our-freshwater-crisis
Hikuroa D (2018) Te Ahi Kaa – Radio NZ
https://www.radionz.co.nz/audio/player?audio_id=2018664556
Hikuroa D (2018) University of Auckland Winter Lecture Series 'New Zealand 2030 – Oceans 2030'
https://www.youtube.com/watch?v=BKZRxmhiZ4A
Hikuroa D (2018) Environmental Defence Society 2018 Conference
https://vimeo.com/284186753
Hikuroa D (2018) Department of Conservation Treaty Partner Summit
https://www.youtube.com/watch?v=f4wxhmSTcuU&feature=share

Hikuroa D, Hannah, K, McInnis-Ng, C. (2018). Loving Our Kauri to Death http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=12037534

Wilson T, Burley N, Whetu J, Te Heuheu L, Puke H, Doherty J, May K, **Hikuroa D** (2016) Ngā Kaihautū Tikanga Taiao Report EEZ000011, re Trans-Tasman Resources Limited

Beverley P, Ehler C, Battershill C, **Hikuroa D**, & Boven R (2015). Sea Change - Tai Timu Tai Pari, Independent Review Panel Reports (x 3).

Hikuroa D, & Kelly S (2016, 2015, 2014). Environmental wellbeing of Māori in Tāmaki Makaurau: Scoping Report and Implementation Plan, *for* Independent Maori Statutory Board.

Hikuroa D (2014) Expert witness for Environment Court, discussing Mauri and Mana and Te Mana o te Wai in the National Policy Statement on Freshwater Management.

Kelly S, **Hikuroa D**, Pierre J, Sim-Smith C, Faire S (2014) Hauraki Gulf – State of the Environment Report, Commissioned by Hauraki Gulf Forum

5. CURRICULUM VITAE, PUBLICATIONS AND OTHER PUBLISHED WORKS

PART 1

1a. Personal details				
Full name	*Title* Dr	*First name* Billie	*Second name(s)* Jane	*Family name* Lythberg
Present position	Senior Lecturer			
Organisation/Employer	University of Auckland Business School			
Contact Address	Private Bag 92019			
	Auckland		**Post code**	1142
Work telephone		**Mobile**	0210439600	
Email	b.lythberg@auckland.ac.nz			

1b. Academic qualifications

2011 Doctor of Philosophy—Art History and Anthropology, University of Auckland
2001 Graduate Diploma in Arts—Art History and Anthropology (UoA)
1997 Master of Arts (Hons) with First Class Honours—Māori Studies and English (UoA)
1994 Bachelor of Arts—English (UoA)

1c. Professional positions held

2020– Senior Lecturer, Department of Management and International Business
2016 Lecturer & Course convenor—*Anthropology and Property*, Anthropology, UoA
2013–20 Research fellow/Senior Research Fellow—Mira Szászy Research Centre
2011 Lecturer & Course Convenor—*Taonga in Museums*, Museums and Cultural Heritage Studies, UoA
2010–2013 Postdoctoral Research Fellow—Artefacts of Encounter Project (Arts and Humanities Research Council & Economic and Social Research Council), MAA CAM (UK)
2010–2012 Research Associate—Te Ataakura Project (Ngā Pae o te Māramatanga), EIT, Tairāwhiti
2009–ongoing Guest Lecturer—*Anthropology and History, Anthropology of Art; Ethnographies of Island Polynesia*, Anthropology, UoA
2008–ongoing Guest Lecturer—*Professional Writing and Marketing Strategies*, Whitecliffe College of Arts and Design
2005–2007 Research Assistant / Marsden Project PhD Scholar, UoA
2002–2005 Project Manager—James Hēnare Māori Research Centre, UoA

1d. Present research/professional speciality

I am an interdisciplinary researcher working at the junction of economics, anthropology and history. Since 2010 I have worked with Māori colleagues in Tairāwhiti exploring the practical application of whakapapa to research questions, an approach that underpins my work focusing on thriving ecologies and economies. Recent projects have considered approaches consistent with hau ora (health and wellbeing), kaitiakitanga (guardianship) and rangatiratanga (right to exercise authority) and their application to: entrepreneurship; health outcome disparities; food sovereignty and security; dairy farming; water quality and industry pollution prevention plans; ‘economic extinction’; and legal personhood. Other outputs counted but not listed below publish my ethnographic and taonga-based research.

1e. Total years research experience	(post-doctorate) 9 years

Since completing my doctorate in 2011 I have worked part time as a researcher; fulltime since March 2018.

1f. Professional distinctions and memberships (including honours, prizes, scholarships, boards or governance roles, etc)

2018 Royal Society of New Zealand Marsden Fund NZ $842,000
Associate Investigator on *Vā Moana: space and relationality in Pacific thought and identity* (2019–22 (3-year project)), with co-PIs Albert Refiti and Tina Engels-Schwarzpaul (AUT)

2017 National Science Challenge NZD $575,000
Assistant Investigator on *Whai Rawa, Whai Mana, Whai Oranga: Creating a world-leading indigenous blue marine economy* (2018–2019), with a team led by Jason Mika (Massey University)

2017 Royal Society of New Zealand Marsden Fund NZD $845,000
Principal Investigator on *Tāngata Tiriti: learning the trick of standing upright here* (2018–20), with co-PIs Chris Woods and Avril Bell

2016 NZ on Air Rautaki Māori Funding NZD $1,200,000
Concept creator and developer, documentary series ARTEFACT for Māori TV

2016 Andrew W. Mellon Foundation Travel Fellow

2016 Royal Society of New Zealand Marsden Fund NZD $530,000
Associate Investigator on Ancient Futures: late 18th and early 19th century Tongan arts and their legacies (2017-19), led by Phyllis Herda

2016 Appointed to editorial board of *Journal of Pacific History*

2016 Appointed affiliated researcher, Pacific Studies Research Group, AUT

2015 Invited Lecturer—Executive MBA in Aboriginal Business and Leadership, Simon Fraser University, British Columbia

2015 Appointed Contributing Editor for Arts of Oceania, SmARThistory—the official partner to Khan Academy for art history

2015 Royal Society of New Zealand Marsden Fund NZD $685,000
Research Fellow on Te Ao Hou: transforming worlds in New Zealand 1900–1950 (2016-18), led by Dame Anne Salmond

2015 Ludwig-Maximilians-University Munich
Invited speaker grant, *Curatopia* symposium, 6–7 July 2015.

2013 Peter Wall Institute for Advanced Studies, University of British Columbia
Invited speaker and fully-funded participant at 'Artefacts of Encounter: Cross-Cultural Exchange in Historical and Interdisciplinary Perspective Workshop', 11–14 April 2013.

2013 ICEHOUSE Funding for Indigenous Social Enterprise Research NZD $30,000

2012 American Museum of Natural History and Richard Gilder Graduate School, New York Collection Study Grant, UDS$1500

2010 Team research grant of NZ$281,000 from Ngā Pae o Te Maramatanga for the collaborative project *Te Ataakura*, led by Dr Wayne Ngata.

2009 Team research Grant of GB£754,000 from the Economic and Social Research Council (UK), *Artefacts of Encounter*, led by Nicholas Thomas and Amiria Salmond (funded post-doc at Cambridge University Museum of Archaeology and Anthropology)

1g. Total number of *peer reviewed* publications and patents	Journal articles	Books	Book chapters, books edited	Conference proceedings	Patents
	35		37, 7	5	

PART 2

2a. Research publications and dissemination

Peer-reviewed journal articles

Lythberg, B. and W. Ngata. **(2019).** Te Aitanga a Hauiti: whale people in the modern whaling era. In: "New Histories of Pacific Whaling," edited by Ryan Tucker and Angela Wanhalla, *RCC Perspectives: Transformations in Environment and Society* 2019, no. 5, 105–112.

Salmond, Anne. and **B. Lythberg (2019).** Spiralling Histories: reflections on the Dominion Museum East Coast Expedition and other multi-media experiments. Proceedings of 'Whakapapa/kinship as practical ontology' panel at ESfO 2017 (Munich). Special issue of the *Journal of Polynesian Studies 128* (1), Conal McCarthy and **Billie Lythberg** (eds.): 43–64.

Lythberg, B., McCarthy, C. and Amiria Salmond. **(2019)**. Introduction: Te Ao Hou. Proceedings of 'Whakapapa/kinship as practical ontology' panel at ESfO 2017 (Munich). Special issue of the *Journal of Polynesian Studies 128* (1), Conal McCarthy and **Billie Lythberg** (eds.): 7–18.

Phillips, T., **Lythberg, B.** and C. Woods **(2016). '**An introduction to the aspirations, governance and management challenges of Māori farming trusts', *Outlook on Agriculture 45* (4): 246–253.

Peer reviewed books, book chapters, books edited

Lythberg, B. and W. Ngata. (2020). 'Economic extinction and cultural property: what it means to be whale people in the modern whaling era', in *New cross-cultural and cross-species histories of Pacific Whaling*, edited by A. Wanhalla and R. Jones. Honolulu: University of Hawai'i Press.

Hēnare, M., **Lythberg, B**., Nicholson, A. and C Woods. **(2017).** 'Te Ohu Umanga Māori: temporality and intent in the Māori entrepreneurial team', in *Research Handbook on Entrepreneurial Teams: Theory and Practice*, **C. Ben-Hafaïedh and T.M. Cooney (Eds.).** London: Edward Elgar.

Lythberg, B., Hogsden., C. and W. Ngata. **(2017).** 'Relational systems and ancient futures: co-creating a digital contact network in theory and practice', in *Engaging Communities (Heritage Matters series)*, B. Onciul, S. Hawke and M. Stefano (Eds.). London: Boydell and Brewer.

Lythberg, B., Hēnare, M. and C Woods. **(2016). '**When the river ran purple: reframing [Māori] *eco*nomics in a global city', *Sustainable Entrepreneurship and Social Innovation*, K. Nicolopoulu, M. Karatas-Ozkan, F. Janssen and J. Jernier (Eds.). London & New York: Routledge, pp. 187–209.

Refereed conference proceedings

Published conference proceedings:

McCarthy, C. & **Lythberg, B.** (eds.) **(2019)** Proceedings of 'Whakapapa/kinship as practical ontology' panel at ESfO 2017 (Munich). Special issue of the *Journal of Polynesian Studies*, March 2019.

Lythberg, B.J., Woods, C.R., & Hēnare, M. **(2015)** 'The Māori marae as a structural attractor'. Conference Proceedings, 75th Academy of management conference, Vancouver, Canada, 7-11 August.

Hēnare, M., **Lythberg, B.,** Woods, C. (2014). Teaming with intent: harmonising heritage, innovation and multiple generations within the Māori entrepreneurial team. *The Business and Management* Review. IMRA-ABRM Conference Proceedings, Cambridge University, UK, 23-24 June 2014.

Lythberg, B. and A. Salmond (eds.) (2012). Digital Subjects, Cultural Objects.

Special Edition of the Journal of Material Culture 17:3, proceedings of a workshop of the same name.

Patents

N/A

Other forms of dissemination (reports for clients, technical reports, popular press, etc)

TV documentaries:

Co-creator (with Rob Antony), academic researcher and museum liaison for '**ARTEFACT'**: 4 x 1 hour documentaries for Prime and Māori TV, screening **2020.**

Co-creator (with Rob Antony) and academic researcher for '**ARTEFACT'**: 6 x 1 hour documentaries for Māori TV, screened May **2018.**

Academic researcher for **'Making New Zealand: Aviation'**: 1 hour documentary for Prime TV, screened 2017.

App creation:

Path to Nationhood mobile device application, with Mānuka Hēnare and New Zealand Historic Places Trust. (2014)
http://www.heritage.org.nz/apps/path-to-nationhood

Commissioned reports:

Rout, M.**, Lythberg, B.,** Mika, J., Gillies, A., Bodwith, H., Hikuroa, D., Awatere, S., Wiremu, F., Rakena, M., Reid, J. **(2019).** 'Kaitiaki-centred business models: case studies of Māori marine-based enterprises in Aotearoa New Zealand', Whai rawa, whai mana, whai oranga: Creating a world-leading indigenous blue marine economy, MBIE National Science Challenge, NZ.

Rout, M., Bodwitch, H., Reid, J. Gillies, A., **Lythberg, B**., Hikuroa, D., Awatere, S., Mika, J., Wiremu, F. and M. Rakena. **(2019).** 'Māori Marine Economy: a literature review'. Whai rawa, whai mana, whai oranga: Creating a world-leading indigenous blue marine economy, MBIE National Science Challenge, NZ.

Lythberg, B., Cocker-Hopkins, R., Nicholson, A., Hunter, I. **(2018).** 'Ngā āhuru mōwai o Te Warawara: Taonga Hotspots in a Diverse Ngāhere', Report commissioned by Landcare (NZ).

Hēnare, M., **Lythberg, B.**, Horan, J., Nicholson, A., Longmuir, K. **(2017).** 'Understanding cultural drivers that impact on health disparities for Māori in Aotearoa-New Zealand', Report commissioned by Janssen NZ Ltd.

Lythberg, B., Woods, C. and G. Thompson. **(2016). '**Priorities to assist the development of Ruapotaka Marae Enterprise, Innovation and Sustainability', Report commissioned by Auckland Council.

Lythberg, B., Woods, C. and T. Sanday. **(2015).** 'Taiao Makaurau—Looking after Pāpātuanuku', Report commissioned by Auckland Council.

Lythberg, B., with T. Chilala and T. Sanday. **(2015).** 'Makaurau Marae—Auckland Council Placement: a marae-initiated and Māori-led collaboration with regional government', Report commissioned by Auckland Council.

Phillips, T., **Lythberg, B.** and C. Woods. (2014). 'Māori Farming Trusts—A Preliminary Scoping Investigation into the Governance and Management of Large Dairy Farm Businesses', Report commissioned by Dairy NZ and Ministry for Primary Industries (2014).

Hēnare, M., Starr, R. and **B. Lythberg.** (2014). 'Rākau ora, Rākau hau: Living Trees, Vitalised Trees—Māori aspirations for economic resilience in forestry and well-being in Northland', Report commissioned by "Building the business case for

economic resilience in Northland: A new forest industry" (Scion 2014), a research programme funded by the Ministry for Primary Industries (MPI) through its Sustainable Farming/Forestry Fund (SFF).

Hēnare, M. and **B. Lythberg.** (2013). 'Northland Stories of Māori and Pākehā Engagement pre-1840', Report commissioned by New Zealand Historic Places Trust (2013).

Selected Presentations:

8 October 2019 Keynote address, *'Amu'i i mu'a*, Nuku'alofa, Tonga.

5 July 2019 Keynote address, *Leonardo LASER Talk,* AUT, Auckland. 'On bottled oceans and canned fish' https://www.leonardo.info/about

19 March 2019 Invited lecture, *Waihorotiu and Waiparuru: creative pathways to buried waterways in Tāmaki Makarau*, Auckland Archaeological Society, Auckland.

30 June 2018 Invited presenter and funded participant, ***New Histories of Pacific Whaling***, a competitive international symposium co-sponsored by the Rachel Carson Center, the University of Oregon and the Centre for Research on Colonial Culture, University of Otago, New Zealand. Honolulu 29–30 June, 2018.

16 September 2017, H2O Life and Death, J.M. Coetzee Centre for Creative Practice, University of Adelaide 'The singing waters of Horotiu: creative pathways to buried waterways in Tāmaki Makaurau'

14 November 2016, Kai Marika, Ngā Pae o te Māramatanga pre-conference workshop, University of Auckland. Workshop convener, and presenter of paper 'The art of Kai Marika'

9–11 May 2016 'He kai kei aku ringa'—'the food is in my hand': local and global perspectives of Indigenous peoples' food security in the context of climate change' Convener, Food Sovereignty and Climate Change Symposium, University of Auckland.

4 November 2015 The 12th Annual Social Entrepreneurship Conference (Stern Business School, NYU), USA Presenter: 'Towards a human economy: reconsidering the legacies of *An Inquiry into the Nature and Causes of the Wealth of Nations* and *Theory of Moral Sentiments* to recontextualise social entrepreneurship' written with Jane Horan (UoA) and Christine Woods (UoA), presented with Woods.

10 August 2015 The 75th Academy of Management Conference, Vancouver, Canada. Presenter: **'**The Māori marae as a structural attractor' written and presented with Mānuka Hēnare (UoA) and Christine Woods (UoA)

26 June 2015 European Society for Oceanists (Brussels), Belgium Presenter: 'I am the river and the river is me' co-authored with Mānuka Hēnare (UoA), Chris Woods (UoA) and Tessa Chilala (Auckland Council)—presented by Lythberg.

5. CURRICULUM VITAE, PUBLICATIONS AND OTHER PUBLISHED WORKS

PART 1

1a. Personal details				
Full name	*Title* PROF	*First name* GARY	*Second name(s)* JOHN	*Family name* BRIERLEY
Present position	Professor, Chair of Physical Geography			
Organisation/Employer	School of Environment, The University of Auckland			
Contact Address	Faculty of Science, 29 Symonds Street			
	Auckland			
			Post code	1142
Work telephone	09 373 7599 x88956	**Mobile**	022 160 5699	
Email	g.brierley@auckland.ac.nz			

1b. Academic qualifications

1989 PhD, Geography, Simon Fraser University: *The character of channel planform control on the morphology and sedimentology of the gravel-bed Squamish River floodplain, British Columbia* (Supervisor: Professor Edward Hickin; External Examiners: Professor Andrew Miall and Professor Derald Smith)

1984 MSc, Geography, Simon Fraser University: *Channel stability and downstream changes in particle size on the Squamish River* (Supervisor: Professor Edward Hickin; External Examiner: Professor Michael Church)

1981 BA (Hons), Geography, Durham University: *Wadi development on the West Bank: A comparative study of form*

1c. Professional positions held

2005–present School of Environment, University of Auckland – Professor and Chair of Physical Geography

2000–2004 Department of Physical Geography, Division of Environmental and Life Sciences, Macquarie University – Associate Professor and Head of Department (2004)

1995–1999 Department of Physical Geography, Division of Environmental and Life Sciences, Macquarie University – Senior Lecturer

1992–1995 Department of Physical Geography, School of Earth Sciences, Macquarie University –Lecturer (tenured in 1994)

1989–1992 Research School of Pacific Studies, The Australian National University, Post Doctoral Fellow

1988–1989 Department of Geography, Simon Fraser University, Canada, Sessional Instructor

1981–1988 Department of Geography, Simon Fraser University, Canada, Teaching/Research Assistant

1980 Chemistry Department, Bethlehem University, West Bank, Teaching Assistant

1977–1978 Imperial Chemical Industries, Manchester, England, Laboratory Technician

1d. Present research/professional speciality

I am a river scientist who specialises in the use of science to inform management applications (especially river rehabilitation and conservation). There has been extensive uptake of a research tool that I co-developed (the River Styles framework; see www.riverstyles.com; see *Nature Communications*, 2019). My primary interest presently lies in the development and application of coherent scientific guidance with which to promote an era of river repair in a manner that respects the inherent diversity and

variability of river systems. This includes a recently published book – *Finding the Voice of the River: Beyond Restoration and Management*. This socio-cultural perspective on rivers builds upon scientific research outputs on a range of inter-related themes including: sedimentology, human impacts on river systems, sediment budgets, river management, environmental governance and education.

My research publications include several books, almost 200 internationally refereed journal articles and book chapters, over 20 refereed conference proceedings, and various review articles/comments, and over 55 commissioned and/or consultancy reports.

1e. Total years research experience	40 years

1f. Professional distinctions and memberships (including honours, prizes, scholarships, boards or governance roles, etc)

2019 Co-ordinator, Project 111 International workshop & field trip, Upper Yellow River
2018 Invited International Expert, São Francisco River Basin Forum, Brazil
2017 Visiting Scientist, CNRS, University of Lyon
2016 Visiting Scientist, University of Vienna
2014 International Collaboration Award, Qinghai Provincial Government, China
2013 High End Foreign Expert, Qinghai University (2013-2015)
2013 Visiting Professor, Utah State University
2013 Visiting Professor, BOKU, Austria
2012 Advisory Board Member, REFORM (European Union) (2012-2015)
2011 Visiting Scientist (UF Rio de Janiero, Recife, Brazil)
2010 Visiting Professorship, Chinese Academy of Sciences (2010-2012)
2009 National University of Singapore Visiting Fellowship
2009 Tsinghua University Advanced Scholar Fellowship
2009 Visiting Fellow, Qinghai University
2008 Visiting Fellow, China University of Geosciences (Beijing)
2007 Macquarie University Research Innovation Prize
2007 Visiting Fellowship, Universiti Sains Malaysia
2007 IAG Regional Conference Award, Borneo
2005 National University of Singapore Centenary Workshop Visitors Award
2004 Shortlisted for the International River Prize
2003 Hokkaido University Visitor Award
2001 CNRS Visitor Award, Lyon, France
2001 IAG International Conference Award, Tokyo
1999 Shinshu University Visitor Award, Japan
1994 Australia-South Africa River Classification Workshop Award

1g. Total number of *peer reviewed* publications and patents	Journal articles	Books	Book chapters, books edited	Conference proceedings	Patents
	163	3	29	30	0

PART 2

2a. Research publications and dissemination

Peer-reviewed journal articles

Poeppl, R. E., Fryirs, K. A., Tunnicliffe, J., & **Brierley, G. J. 2020**. Managing sediment (dis) connectivity in fluvial systems. *Science of The Total Environment*, 139627.

Han, M., **Brierley, G.**, Li, B., Li, Z., & Li, X. **2020**. Impacts of flow regulation on geomorphic adjustment and riparian vegetation succession along an anabranching reach of the Upper Yellow River. *Catena*, *190*, 104561.

Han, M., **Brierley, G. 2020**. Channel geomorphology and riparian vegetation interactions along four anabranching reaches of the Upper Yellow River. *Progress in Physical Geography*. In press.

Fryirs, K. A., **Brierley**, G. J. & Dixon, T. **2019**. Engaging with research impact assessment for an environmental science case study. *Nature Communications*. 10(1), 1-10.

* **Brierley, G.**, Tadaki, M., Hikuroa, D., Blue, B., Šunde, C., Tunnicliffe, J., & Salmond, A. **2019**. A geomorphic perspective on the rights of the river in Aotearoa New Zealand. *River Research and Applications, 35*(10), 1640-1651

* Fryirs, K. A., Wheaton, J. M., Bizzi, S., Williams, R., & **Brierley, G. J. 2019**. To plug-in or not to plug-in? Geomorphic analysis of rivers using the River Styles Framework in an era of big data acquisition and automation. *Wiley Interdisciplinary Reviews: Water*, e1372.

* Salmond, A., **Brierley, G.,** & Hikuroa, D. **2019**. Let the Rivers Speak. *Policy Quarterly*, *15*(3), 45-54.

Brierley, G., Fryirs, K., dos Santos Marçal, M., & Lima, R. **2019**. The use of the River Styles Framework as a tool to 'work with nature' in managing rivers in Brazil: Examples from the Macaé Catchment. *Revista Brasileira de Geomorfologia*, *20*(4).

Fryirs, K., **Brierley, G.,** dos Santos Marçal, M., Peixoto, M. N., & Lima, R. **2019**. Learning, Doing and Professional Development–The River Styles Framework as a tool to support the development of coherent and strategic approaches for land and water management in Brazil. *Revista Brasileira de Geomorfologia*, *20*(4).

Wohl, E., **Brierley, G.**, Cadol, D., Coulthard, T. J., Covino, T., Fryirs, K. A., ... & Meitzen, K. M. **2019.** Connectivity as an emergent property of geomorphic systems. *Earth Surface Processes and Landforms*, *44*(1), 4-26.

Reid, H. E., Williams, R. D., **Brierley, G. J.**, Coleman, S. E., Lamb, R., Rennie, C. D., & Tancock, M. J. (2019). Geomorphological effectiveness of floods to rework gravel bars: insight from hyperscale topography and hydraulic modelling. *Earth Surface Processes and Landforms*, *44*(2), 595-613.

Williams, R. D., Reid, H. E., & **Brierley, G. J.** (2019). Stuck at the bar: larger-than-average grain lag deposits and the spectrum of particle mobility. *Journal of Geophysical Research: Earth Surface*, *124*(12), 2751-2756.

O'Brien, G. R., Wheaton, J. M., Fryirs, K., Macfarlane, W. W., **Brierley, G.**, Whitehead, K., ... & Volk, C. **2019**. Mapping valley bottom confinement at the network scale. *Earth Surface Processes and Landforms*. *44*(9), 1828-1845

* Tunnicliffe, J., **Brierley, G.**, Fuller, I. C., Leenman, A., Marden, M., & Peacock, D. **2018**. Reaction and relaxation in a coarse-grained fluvial system following catchment-wide disturbance. *Geomorphology*. 307, 50-64.

* Walley, Y., Tunnicliffe, J., & **Brierley, G. 2018**. The influence of network structure

upon sediment routing in two disturbed catchments, East Cape, New Zealand. *Geomorphology*. 307, 38-49.

Fryirs, K. A., & **Brierley, G. J. 2018**. What's in a name? A naming convention for geomorphic river types using the River Styles Framework. *PloS one*, *13*(9), e0201909.

* Fryirs, K. A., **Brierley, G. J.**, Hancock, F., Cohen, T. J., Brooks, A. P., Reinfelds, I., ... & Raine, A. (2018). Tracking geomorphic recovery in process-based river management. *Land Degradation & Development*, *29*(9), 3221-3244.

Marçal, M., **Brierley, G.**, & Lima, R. **2017**. Using geomorphic understanding of catchment-scale process relationships to support the management of river futures: Macaé Basin, Brazil. *Applied Geography*, *84*, 23-41.

O'Brien, G. R., Wheaton, J., Fryirs, K., McHugh, P., Bouwes, N., **Brierley, G.**, & Jordan, C. **2017**. A geomorphic assessment to inform strategic stream restoration planning in the Middle Fork John Day Watershed, Oregon, USA. *Journal of Maps*, *13*(2), 369-381.

* Blue, B., & **Brierley, G. 2016**. 'But what do you measure?' Prospects for a constructive critical physical geography. *Area*. 48, 190-197.

* **Brierley, G. J.**, & Fryirs, K. A. **2016**. The use of evolutionary trajectories to guide 'Moving Targets' in the management of river futures. *River Research and Applications*. 32, 823-835.

* Fryirs, K. & **Brierley, G.J. 2016**. Assessing the geomorphic recovery potential of rivers: Forecasting future trajectories of adjustment for use in management. *WIRES Water*. 3, 727-748.

Fryirs, K. A., Wheaton, J. M., & **Brierley, G.J. 2016**. An approach for measuring confinement and assessing the influence of valley setting on river forms and processes. *Earth Surface Processes and Landforms*. 41, 701-710.

Gurnell, A. M., Rinaldi, M., Buijse, A. D., **Brierley, G.**, & Piégay, H. **2016**. Hydromorphological frameworks: emerging trajectories. *Aquatic Sciences*, 78, 135-138.

Kasprak, A., Hough-Snee, N., Beechie, T., Bouwes, N., **Brierley, G.**, Camp, R., Fryirs, K., Imaki, H., Jensen, M., O'Brien, G. & Rosgen, D. **2016**. The blurred line between form and process: A comparison of stream channel classification frameworks. *PLOS ONE*, *11*(3), p.e0150293.

Kuo, C. -W., **Brierley, G.**, & Chang, Y. -H. **2015**. Monitoring channel responses to flood events of low to moderate magnitudes in a bedrock-dominated river using morphological budgeting by terrestrial laser scanning. *Geomorphology*, *235*, 1-14.

* Reid, H. E., & **Brierley, G. J. 2015**. Assessing geomorphic sensitivity in relation to river capacity for adjustment. *Geomorphology*, *251*, 108-121.

Wheaton, J. M., Fryirs, K. A., **Brierley, G.**, Bangen, S. G., Bouwes, N., & O'Brien, G. **2015**. Geomorphic mapping and taxonomy of fluvial landforms. *Geomorphology*, *248*, 273-295.

* Tadaki, M., **Brierley, G.J.** & Cullum, C. 2014. River classification: Theory, practice, practice, politics. *Wiley Interdisciplinary Reviews: Water*, *1*(4), 349-367.

* **Brierley, G.J.**, Fryirs, K.A., Cullum, C., Tadaki, M., Huang, H.Q. and Blue, B. 2013. Reading the landscape: Integrating the theory and practice of geomorphology to develop place-based understandings of river systems. *Progress in Physical Geography*. 37, 601–621.

Yu, G., Huang, H.Q., Wang, Z., **Brierley, G.J.** and Zhang, K. 2012. Rehabilitation of steep-slope, debris-prone mountain stream in Southwest China – strategies, effects and implications. *Journal of Hydrology*. 414-415, 231-243.

*** Brierley, G.J.**, Fryirs, K.A. Cook, N., Outhet, D., Raine, A., Parsons, L. and Healey, M. 2011. Geomorphology in action: Linking policy with on-the-ground actions

through applications of the River Styles framework. *Applied Geography*. 31, 1132-1143.

* **Brierley, G.J.** Reid, H.E., Fryirs, K.A. & Trahan, N. 2010. What are we monitoring and why? Using geomorphic principles to frame eco-hydrological assessments of river condition. *Science of the Total Environment*. 408, 2025-2033.

* **Brierley, G.J.** & Fryirs, K.A. 2009. Don't fight the site: Three geomorphic considerations in catchment-scale river rehabilitation planning. *Environmental Management*. 43 (6), 1201-1218.

Fryirs, K. **Brierley, G.J.**, Preston, N. & Spencer, J. **2007**. Catchment-scale (dis)connectivity in sediment flux in the Upper Hunter catchment, New South Wales, Australia. *Geomorphology*. 84, 297-316.

Brierley, G.J., Fryirs, K. & Jain, V. **2006**. Landscape connectivity: The geographic basis of geomorphic applications. *Area*. 38.2, 165-174.

Chessman, B.C., Fryirs, K.A. & **Brierley, G.J. 2006**. Linking geomorphic character, behaviour and condition to fluvial biodiversity: implications for river rehabilitation. *Aquatic Conservation: Marine and Freshwater Ecosystems*. 16, 267-288.

* Kasai, M., **Brierley, G.J.**, Page, M.J., Marutani, T. and Trustrum, T.A. **2005**. Impacts of land use change on patterns of sediment flux in Weraamaia catchment, New Zealand. *Catena*. 64(1), 27-60.

* Brooks, A.P. & **Brierley, G.J.** 2004. Framing realistic river rehabilitation programs in light of altered sediment transfer relationships: lessons from East Gippsland, Australia. *Geomorphology*. 58, 107-123.

Reinfelds, I., Cohen, T., Batten, P., Jansen, J. & **Brierley, G.J.** 2004. Catchment-wide modelling of stream power: examples from the Bellinger River, NSW, Australia. *Geomorphology*. 60, 403-416.

Brierley, G.J., Fryirs, K., Outhet, D. & Massey, C. 2002. Application of the River Styles framework as a basis for river management in New South Wales, Australia. *Applied Geography*. 22, 91-122.

Thomson, J., Taylor, M.A., Fryirs, K. & **Brierley, G.J.** 2001. River Styles as a geomorphic framework for habitat assessment. *Aquatic Conservation: Marine and Freshwater Ecosystems*. 11, 373-389.

Brierley, G.J. & Fryirs, K. 2000. River styles, a geomorphic approach to catchment characterization: Implications for river rehabilitation in Bega catchment, New South Wales, Australia. *Environmental Management*. 25, 661-679.

Brierley, G.J., Cohen, T, Fryirs, K. & Brooks, A. 1999. Post-European changes to the fluvial geomorphology of Bega catchment, Australia: implications for river ecology. *Freshwater Biology*. 41, 1-10.

Peer reviewed books

*** Brierley, G.J. 2020**. *Finding the Voice of the River: Beyond Restoration and Management*. Palgrave Pivot.

Fryirs, K. and Brierley, G.J. 2013. *Geomorphic Analysis of River Systems. An Approach to Reading the Landscape*. Blackwell, Oxford, UK.

Brierley, G.J. and Fryirs, K.A. 2005. *Geomorphology and River Management: Applications of the River Styles framework*. Blackwell Science, Oxford, UK. 398pp.

Peer reviewed book chapters, books edited

Brierley, G.J., Li, X.L., Cullum, C. and Gao, J. **2016**. *Landscape and Ecosystem Diversity, Dynamics and Management in the Yellow River Source Zone*.

5. CURRICULUM VITAE, PUBLICATIONS AND OTHER PUBLISHED WORKS

PART 1

1a. Personal details				
Full name	*Title* Mr	*First name* Walton	*Second name(s)* Haig	*Family name* Walker
Present position	Senior Māori Engagement Officer			
Organisation/Employer	Gisborne District Council			
Contact Address	101 Iranui Road Kaiti Gisborne			
			Post code	4010
Work telephone	**ph** +64 6 867 249 | **ddi** 06 869 2453 |	**Mobile**	**mob** 027 694 7843	
Email	walton.walker@gdc.govt.nz or wananga.walker@gmail.com			
Personal website (if applicable)	http://			

1b. Academic qualifications

- **2007** Post-graduation Diploma in Interpretation and Translation (Te Reo Māori), University of Waikato
- **1999** MBA University of South Pacific
- **1976** BA (Anthropology and Te Reo Māori), Victoria University of Wellington

1c. Professional positions held

- **2019–present** Senior Maori Engagement Officer, Gisborne District Council, Gisborne
- **2010–2019** Senior Advisory Officer, Ministry of Education, Gisborne
- **2008–2010** Manager, Social Sciences, Tairāwhiti Polytechnic, Gisborne
- **2004–2008** Tutor, Te Whatukura, Tairāwhiti Polytechnic, Gisborne
- **1989–2004** Editor, Writer, Programme Manager, Learning Media, Wellington – reviving Te Whatukura and Te Tautoko Maori language series for schools
- **1984–1988** Project Manager, Maori and South Pacific Arts Council (MASPAC), Wellington
- **1979–1984** Researcher, Department of Justice, Wellington
- **1977–1978** Librarian, National Museum, Wellington

1d. Present research/professional speciality

Working as an iwi historian in te reo, researching and sharing ancestral stories in relation to Tairāwhiti landscapes in many different contexts, especially with young people – in series of newspaper articles, public lectures, curricular material for schools, story-telling with waka ama crews, and translating significant iwi publications into te reo; and linking this research with mapping techniques including Lidar, which is available at Gisborne District Council.

The Waimatā River is of particular personal interest, given a long engagement with waka ama paddling on the river. In its current state, the launching place for waka ama on the Waimatā and the water in the river alike present significant health risks to waka ama crews, with high levels of contamination from farm waste and sewage leading to many infections. Sediment from erosion on farms and in forests is being deposited on the river floor, narrowing the channel and making it shallow in many places. The waka ama community, which is strong in Tūranga-nui-a-Kiwa, is eager to see the river restored to a clean and healthy state.

1e. Total years research experience	43 years

1f. Professional distinctions and memberships (including honours, prizes, scholarships, boards or governance roles, etc)

- **2017–present:** Member, Gisborne Rotary Club
- **2010–present:** Chairman, Ngā Taonga a Ngā Tamatoa Trust
- **2008–present:** Trustee, Ohinewaiapu Marae, Rangitiukia
- **2006–present:** Chairman, Reporua Marae
- **2005–present:** President, Horouta Waka Ama Club
- **2004–present:** Chairman, Tairāwhiti Softball Association

1g. Total number of *peer reviewed* publications and patents	Journal articles	Books	Book chapters, books edited	Conference proceedings	Patents

PART 2

2a. Research publications and dissemination

Peer-reviewed journal articles

Peer reviewed books

Peer reviewed book chapters, books edited

Refereed conference proceedings

Patents

Other forms of dissemination (reports for clients, technical reports, popular press, etc)

- **Maunga Korero Series 2007–2010**
  Wrote 24 articles on Tairawhiti Maori history relating to 24 maunga throughout the Te Tairawhiti, Mahia, Wairoa, Heretaunga and Te Whanau a Apanui. Printed in Gisborne Herald 2007-2010. See attached website.
  https://maungakorero.wordpress.com/maunga-korero/
  https://pubs.gisborneherald.co.nz/sites/default/files/publications/pdfs/2019/10/080610fe.pdf

- **Nga Tama Toa Translation 2010–2015**
  Project Manager and facilitator of translation of *Nga Tama Toa—The Price of Citizenship* by Dr. Monty Soutar. Translation team included, Dr Apirana Mahuika, Dr Koro Dewes, Willie Kaa, Jossie Kaa, Sir Tamati Reedy, Dame Tilly Reedy, Tussie Butler-Gamble, Muriwai Jones, Bill Maxwell, Kahu Sterling, Lewis Moeau, Rutene Irwin. Project done in collaboration between the Ministry of Education, Te Runanganui o Ngati Porou and Nga Taonga a Tama Toa Trust.
  http://www.gisborneherald.co.nz/lifestyle/2050489-138/speaking-te-reo-maori/

- **Te Runanga o Turanganui-a-Kiwa TROTAK Tipuna Stories 2010–2018**
  Project facilitator for Ministry of Education to develop and produce initial x4 stories and teachers notes of Turanganui Iwi tipuna. Project has now produced x10 tipuna stories.
  http://www.gisborneherald.co.nz/local-news/20190529/turning-ancestors-stories-into-a-3d-journey/

- **The Journeys and Settlements of Our Ancestors 2012–2014**
  Public presentations on x6 key Te Tairawhiti tipuna—Tuwhakairiora (1625AD); Uetaha and Tamakoro (1600AD); Hinetapora and Tamahae (1675) and Kahungunu (1575).
  https://ngatiporou.com/article/rangatira

- **Ngata Lectures 2014**
  Tūwhakairiora—presentation of the life and times of warrior ancestor and diplomat Tūwhakairiora, at Te Papa Tongarewa. 4–7 September, 2014.
  https://ngatiporou.com/sites/default/files/event/download/Ngata-Lectures-Programme.pdf

- **Ngata Lectures 2015**
  Te Tokotoru a Iranui—Co-presentation of the three sons of Iranui: Taua, Mahaki and Hauiti, at Porourangi, Tukaki and Hauiti marae. Presenters: Cliff Whiting, Walton Walker, Derek Lardelli, Selwyn Parata, Rikirangi Gage, Wayne Ngata, Victor Walker me etahi atu. 27–30 September, 2015.
  https://ngatiporou.com/nati-story/ngata-lectures-2015

- **Maunga Korero Presentations 2012–2020:** Innumerable public and corporate deliveries of *Maunga Korero* lectures and power-point presentations.

5. CURRICULUM VITAE AND PUBLICATIONS

PART 1

1a. Personal details				
Full name	*Title* Dr	*First name* *Siouxsie*	*Second name(s)*	*Family name* Wiles
Present position	Associate Professor			
Organisation/Employer	University of Auckland			
Contact Address	Department of Molecular Medicine & Pathology			
	85 Park Road, Grafton/Private Bag 92019			
	Auckland		**Post code**	1142
Work telephone	+64 9 3737599 Ext 84284	**Mobile**	+64 21 966 551	
Email	s.wiles@auckland.ac.nz			
Personal website (if applicable)	http://www.superbugslab.org/			

1b. Academic qualifications

2002, PhD, Microbiology, Napier University, Edinburgh, UK.

1997, BSc (Hons) First class, Medical Microbiology, University of Edinburgh, UK

1c. Professional positions held

2018-Present, Associate Professor, University of Auckland

2014-2018, Senior Lecturer, University of Auckland

2009-2015, Present, Honorary Lecturer, Imperial College London, UK

2009-2014, HRC Hercus Fellow, University of Auckland

2007-2009, Lecturer, Imperial College London, UK

2003-2007, Post-doctoral Researcher, Imperial College London, UK

2000-2003, Post-doctoral Researcher, Imperial College London, UK

1d. Present research/professional speciality

With a background in medical and environmental microbiology, I have made a career out of combining my twin passions of bioluminescence (think glow worms and fireflies) and infectious diseases. Tagging bacteria with the genes for bioluminescence allows us to use light as a surrogate marker for bacterial numbers; using a luminometer or sensitive charge coupled device (CCD) camera we can quantify bacteria, non-destructively and in real-time, by the amount of light emitted, identifying where they are and whether they are dead or alive. My area of expertise is mouse models of infection, biophotonic imaging, and antibiotic discovery. My research interests lie in investigating microbial adaptation and transmission/infectivity in various human pathogenic microbes, in addition to applying bioluminescence and biophotonic imaging to antibiotic discovery and development. My lab developed rapid and cost-effective methods which are now used around the world to screen for compounds and vaccines to combat *Mycobacterium tuberculosis*, the bacterium responsible for TB.

I have published 54 peer-reviewed articles. My total citation index is >3,100 with 22 publications having citation indices of ≥50. My H-factor is 28. I spent my postdoctoral years at Imperial College London, making glowing derivatives of various infectious organisms. My work on the bacterium *Citrobacter rodentium* culminated in winning the inaugural 3Rs prize from the UK National Centre for the Replacement, Refinement and Reduction of Animals in Research (NC3Rs).

I have an interest in science communication in its many forms, and have worked with artists, animators, and illustrators. My efforts in this area have been recognised with numerous awards including the Prime Minister's Science Media Communication Prize, and Royal Society Te Apārangi's Callaghan Medal. In 2017 I published my first popular science book, 'Antibiotic resistance: the end of modern medicine?', and in 2018 collaborated with my daughter to make a kid's show about microbiology.

This year, I joined forces with Spinoff cartoonist Toby Morris to make the science of the COVID-19 pandemic clear and understandable. We released our work under a Creative Commons licence which has seen our graphics translated into multiple languages and many have been adapted by various governments and organisations as part of their official pandemic communications. A collection of our work can be seen here: https://thespinoff.co.nz/media/19-05-2020/the-great-toby-morris-siouxsie-wiles-covid-19-omnibus/

1e. Total years research experience	18 years post-PhD

1f. Professional distinctions and memberships (including honours, prizes, scholarships, boards or governance roles, etc)

2019 Appointed a Member of the New Zealand Order of Merit for services to microbiology and science communication in the New Year Honours list

2018 Finalist, Kiwibank New Zealander of the Year

2016 Blake Leader Award, Sir Peter Blake Trust

2015 Elected a councillor of the Royal Society of New Zealand

2014 Cam Reid orator at the 2014 symposium of the Australian and New Zealand Council for the Care of Animals in Research and Teaching (ANZCCART)

2013 Royal Society Te Apārangi Callaghan Medal

2013 Prime Minister's Prize for Science Media Communication

2012 NZ Association of Scientists Science Communication Prize

2012 Became an advisory board member of SciFund Challenge, an international non-profit organisation based in the USA that facilitates crowdfunding for scientific research and training in science communication

2012 Became an advisory board member of Addgene, an international non-profit organisation based in the USA that facilitates biomedical research by operating a library for published and useful plasmids

2011 National Animal Ethics Advisory Committee (NAEAC) Three Rs award

2009 Health Research Council Sir Charles Hercus Fellowship

2009 UK Westminster Poster Event hosted by the NC3Rs in March 2009: Poster 'Lighting the way to reducing animal use' highly commended by judging panel.

2005 Inaugural UK National Centre for the Replacement, Refinement & Reduction of Animals in Research (NC3Rs) 3Rs Prize sponsored by GlaxoSmithKline. Prize of 10,000 GBP presented by the Minister for Science, Lord Sainsbury, at the NC3Rs Stakeholder meeting in January 2006.

1g. Total number of *peer reviewed* publications and patents	Journal articles	Books, book chapters, books edited	Conference proceedings	Patents
	54	3	4	

2a. Research publications and dissemination

Selected peer-reviewed journal articles; # open access

Yathursan S, **Wiles S**, Read H, Sarojini V (**2019)**. A review on anti-tuberculosis peptides: impact of peptide structure on anti-tuberculosis activity. J Peptide Sci. 25 (11), e3213.

#Ryder BM, Sandford SK, Manners KM, Dalton JP, **Wiles S**, Kirman JR **(2019**). Gr1int/high cells dominate the early phagocyte response to mycobacterial lung infection in mice. Front Microbiol. 0:402. doi: 10.3389/fmicb.2019.00402.

#Lamb LE, Zhi X, Alam F, Pyzio M, Scudamore CL, **Wiles S**, Sriskandan S (**2018**). Modelling invasive group A streptococcal disease using bioluminescence. BMC Microbiol. 18(1):60. doi: 10.1186/s12866-018-1200-1.

Sun Y, Emolo C, Holtfreter S, **Wiles S**, Kreiswirth B, Missiakas D, Schneewind O (**2018**). Staphylococcal protein A contributes to persistent colonization of mice with *Staphylococcus aureus*. J Bacteriol. 12. pii: JB.00735-17.

#Mrochen DM, Grumann D, Schulz D, Gumz J, Trübe P, Pritchett-Corning K, Johnson S, Nicklas W, Kirsch P, Martelet K, Brandt JVD, Berg S, Bröker BM, **Wiles S**, Holtfreter S (**2018**). Global spread of mouse-adapted *Staphylococcus aureus* lineages CC1, CC15, and CC88 among mouse breeding facilities. Int J Med Microbiol. 308(6):598-606.

#Dalton JP, Uy B, Swift S, **Wiles S** (**2017**). A novel restraint device for injection of *Galleria mellonella* larvae that minimizes the risk of accidental operator needle stick injury. Front Cell Infect Microbiol. 7:99. doi: 10.3389/fcimb.2017.00099.

#Dalton JP, Uy B, Okuda K, Hall CJ, Denny WA, Crosier PS, Swift S, **Wiles S** (**2017**). Screening of anti-mycobacterial compounds in a naturally infected zebrafish embryo model. J. Antimicrob. Chemother. 72(2):421-427.

#Schulz D, Grumann D, Trübe P, Pritchett-Corning K, Johnson S, Reppschläger K, Gumz J, Sundaramoorthy N, Michalik S, Berg S, van den Brandt J, Fister R, Monecke S, Uy B, Schmidt F, Bröker BM, **Wiles S**, Holtfreter S (**2017**). Laboratory mice are frequently colonized with *Staphylococcus aureus* and mount a systemic immune response-note of caution for in vivo infection experiments. Front Cell Infect Microbiol. 7:152.

Shirley OC, Bayan A, Zhu M, Dalton JP, **Wiles S**, Young SW (**2017**). Do surgical helmet systems affect intraoperative wound contamination? A randomised controlled trial. Arch Orthop Trauma Surg. 137(11):1565-1569.

#Dalton JP, Uy B, Phummarin N, Copp BR, Denny WA, Crosier PS, Swift S, **Wiles S** (**2016**). Effect of common and experimental anti-tuberculosis treatments on *Mycobacterium tuberculosis* growing as biofilms. PeerJ. 4:e2717.

#Phummarin N, Boshoff HI, Tsang PS, Dalton J, **Wiles S**, Barry CE, Copp BR (**2016**). SAR and identification of 2-(quinolin-4-yloxy) acetamides as *Mycobacterium tuberculosis* cytochrome bc1 inhibitors. Med. Chem. Commun. 7(11):2122-2127.

#Read H, Mills G, Johnson S, Tsai P, Dalton J, Barquist L, Print C, Patrick WM, **Wiles S (2016)**. The in vitro and in vivo effects of constitutive light expression on a bioluminescent strain of the mouse enteropathogen *Citrobacter rodentium*. PeerJ. 4:e2130.

Wang J, Pearce AN, Chan S, Taylor R, Page M, Valentin A, Bourguet-Kondracki

ML, Dalton J, **Wiles S**, Copp B **(2016)**. Biologically active acetylinic amino alcohol and N-hydroxylated 1,2,3,4-tetrahydro-β-carboline constituents of the New Zealand Ascidian *Pseudodistoma opacum*. J. Nat. Prod., 79(3):607–610.

#Robertson J, Dalton J, **Wiles S**, Gizdavic-Nikolaidis M, Swift S **(2016)**. The tuberculocidal activity of conducting polymers: support for their incorporation into facemasks to improve infection control. PeerJ. 4:e2795. doi: 10.7717/peerj.2795.

#Young SW, Roberts T, Johnson S, Dalton J, Coleman B, **Wiles S** (**2015**). Regional intraosseous delivery of prophylactic antibiotics effective in a murine model of total knee arthroplasty. Clinical Orthopaedics and Related Research. 473(11):3573-84.

#Vanhoecke BW, De Ryck TR, De Boel K, **Wiles S**, Boterberg T, Van de Wiele T, Swift S (**2015**). Low-dose irradiation affects the functional behavior of oral microbiota in the context of mucositis. Experimental Biology and Medicine. 22. pii: 1535370215595467.

#Williamson DA, Mills G, Porter S, Paterson DL, Johnson JR, **Wiles S** (2014). *In vivo* correlates of molecular virulence in extraintestinal pathogenic (ExPEC) *Escherichia coli* using the wax moth *Galleria mellonella* model system. Virulence. 5(3): 388-393.

#Alam F, Bateman C, Turner CE, **Wiles S**, Sriskandan S (2013). Non-invasive monitoring of *Streptococcus pyogenes* vaccine efficacy using biophotonic imaging. PLOS One. 8(11): e82123. doi:10.1371/journal.pone.0082123.

#Williamson DA, Freeman JT, Porter S, **Wiles S**, Roberts SA, Johnson JR (2013). Clinical and molecular correlates of virulence in *Escherichia coli* causing bloodstream infection following transrectal ultrasound (TRUS)-guided prostate biopsy. J. Antimicrob. Chemother. 13(1):385.

#Holtfreter S, Radcliff FJ, Grumann D, Read H, Johnson S, Monecke S, Ritchie S, Clow F, Goerke C, Broker B, Fraser JD, **Wiles S** (2013). Characterization of a mouse-adapted *Staphylococcus aureus* strain - a unique tool for studying host pathogen interactions in the mouse model. PLOS One. 8(9): e71142.

#Loh JM, Adenwalla N, **Wiles S**, Proft T (2013). *Galleria mellonella* larvae as an infection model for Group A streptococcus. Virulence. 4(5).

#Andreu N, Zelmer A, Sampson SL, Ikeh M, Bancroft GJ, Schaible UE, **Wiles S**, Robertson BD (2013). Rapid in vivo assessment of drug efficacy against *Mycobacterium tuberculosis* using an improved firefly luciferase. J. Antimicrob. Chemother. 68(9):2118-27.

Arafah S, Kicka S, Trofimov V, Hagedorn M, Andreu N, **Wiles S**, Robertson B, Soldati T (2013). Setting Up and Monitoring an Infection of *Dictyostelium discoideum* with Mycobacteria. Methods Mol Biol 983:403-17.

#Zelmer A, Carroll P, Andreu N, Hagens K, Mahlo J, Redinger N, Robertson B, **Wiles S**, Ward T, Parish T, Ripoll J, Bancroft G, Schaible U (2012). A new in vivo model to test anti-tuberculosis drugs using fluorescence imaging. J. Antimicrob. Chemother. 67 (8): 1948-60.

#Andreu N, Fletcher T, Krishnan N, **Wiles S**, Robertson BD (2012). Rapid measurement of antituberculosis drug activity in vitro and in macrophages using bioluminescence. J. Antimicrob. Chemother. 67(2): 404-14

#Petty NK, Feltwell T, Pickard D, Clare S, Toribio AL, Fookes M, Roberts K, Monson R, Nair S, Kingsley RA, Bulgin R, **Wiles S**, Goulding D, et al.

(2011) *Citrobacter rodentium* is an unstable pathogen showing evidence of significant genomic flux. PLOS Pathog 7(4): e1002018.

#Andreu N, Zelmer A, **Wiles S** (2011). Non-invasive biophotonic imaging for studies of infectious disease. FEMS Microbiol. Revi. 35(2):360-394.

#Andreu N, Zelmer A, Fletcher T, Elkington PT, Ward TH, Ripoll J, Parish T, Bancroft GJ, Schaible UE, Robertson BD, **Wiles S** (2010). Optimisation of Bioluminescent Reporters for Use with Mycobacteria. PLOS One. 5(5): e10777.

Dennis A, Kudo T, Kruidenier L, Girard F, Crepin VF, MacDonald TT, Frankel G, **Wiles S** (2008). The p50 subunit of NF-κB is critical for in vivo clearance of the non-invasive enteric pathogen *Citrobacter rodentium*. Infect. Immun. 76:4978-4988.

Hemrajani C, Marches O, **Wiles S**, Girard F, Dennis A, Dziva F, Best A, Phillips AD, Berger C, Mousnier A, Crepin VF, Kruidenier L, Woodward MJ, Stevens MP, La Ragione RM, MacDonald TT, Frankel F (2008). Role of NleH, a type III secreted effector from attaching and effacing pathogens, in colonization of the bovine, ovine and murine gut. Infect. Immun. 76:4804-4813.

Bishop AL, **Wiles S**, Dougan G, Frankel G (2007). Cell attachment properties and infectivity of host-adapted and environmentally-adapted *Citrobacter rodentium*. Microb. Infect. 9:1316-1324.

Wiles S, Hanage WP, Frankel G, Robertson BD (2006). Modelling infectious disease – time to think outside the box? Nature Rev. Microbiol. 4:307-312.

Wiles S, Pickard KM, Peng K, Macdonald TT, Frankel G (2006). In vivo bioluminescence imaging of the murine pathogen *Citrobacter rodentium*. Infect. Immun. 74:5391-5396.

Kelly M, Hart E, Mundy R, Marches O, **Wiles S**, Badea L, Luck S, Tauschek M, Frankel G, Robins-Browne RM, Hartland EL (2006). Essential role of the type III secretion system effector NleB in colonization of mice by *Citrobacter rodentium*. Infect. Immun. 74:2328-2337.

Wiles S, Dougan G, Frankel G (2005). Emergence of a 'hyperinfectious' bacterial state after passage of *Citrobacter rodentium* through the host gastrointestinal tract. Cell. Microbiol. 7:1163-1172.

Mundy R, MacDonald TT, Dougan G, Frankel G, **Wiles S** (2005). *Citrobacter rodentium*: of mice and man. Cell. Microbiol. 7:1697-1706.

Dahan S, **Wiles S**, La Ragione RM, Best A, Woodward MJ, Stevens MP, Shaw RK, Chong Y, Knutton S, Phillips A, Frankel G (2005). EspJ is a prophage-encoded type III effector protein of attaching and effacing pathogens that modulates infection dynamics. Infect. Immun. 73:679-686.

Wiles S, Clare S, Harker J, Huett A, Young DB, Dougan G, Frankel G (2004). Organ-specificity, colonization and clearance dynamics in vivo following oral challenges with the murine pathogen *Citrobacter rodentium*. Cell. Microbiol. 6:963-972.

Other forms of dissemination (reports for clients, technical reports, popular press, etc)

Book: 'Antibiotic Resistance: The End of Modern Medicine' published by BWB Texts in April 2017, described by Otago's Prof Kurt Krauss as "Engagingly written, well informed and provocative" (https://www.bwb.co.nz/books/antibiotic-resistance).

Writing: Fortnightly science columnist for Stuff. Column appears online, and in print in

8. OTHER FUNDING

i) Funding received

Title of application	Funding source	Investigator(s) involved (& FTE)	Relationship to current Marsden proposal
Brierley (Partner Investigator): Working with recovery: Future proofing our rivers against floods & droughts	Australian Research Council (Australia) Grant Linkage Project ARC LP190100314	Fryirs et al. (Macquarie University) …Brierley involvement 0.1FTE	No direct relation, but recovery work aligns with this proposal
Brierley (Partner Investigator): Development and application of geomorphic tool for sustainable management of a Himalayan river system, India	Scheme for Promotion of Academic and Research Collaboration (SPARC, India): Project 383	Jain et al. (IIT Gandhinagar) …Brierley involvement 0.05 FTE (2019, 2020)	No direct relation, but work at the science-management interface may support uptake of findings from this work (in India and beyond)
Brierley (Partner Investigator): Catchment susceptibility to hydrometeorological events: sediment flux and geomorphic change as drivers of flood risk in the Philippines	NERC (UK): 303063	Williams et al (Glasgow University) …Brierley involvement 0.05 FTE (2019, 2021)	No direct relation, but work at the science-management interface may support uptake of findings from this work (in the Philippines and beyond)
Te Awaroa: restoring rivers in Aotearoa New Zealand Waimatā Catchment Restoration Project	Tindall Foundation NEXT Foundation Ngā Pae o te Māramatanga MPI Erosion Control Fund	PI Anne Salmond, Gary Brierley, Dan Hikuroa Ditto Dan Hikuroa, Anne Salmond Chairperson, Anne Salmond	Preliminary Research Practical restoration project

ii) Funding applied for

Title of application	Funding source	Investigator(s) involved (& FTE)	Relationship to current Marsden proposal
Brierley (PI): The river that carries mountains to the sea: highly-resolved topographic change at catchment scale	Marsden	Tunnicliffe, Brierley, Brasington (2020 Marsden Fund Preliminary Round: 20-UOA-103) *Unsuccessful*	Same region, but unrelated to this proposal

b) Indicate any current or previous Marsden-funding of all Principal and Associate Investigators.

Investigator's name	Title of research programme	Role (PI or AI)	FTE	Dates of tenure
Anne Salmond	Te Ao Hou	PI	.1	2016-20
Anne Salmond	Te Ao Tawhito	PI	.1	2010-15
Anne Salmond	Cross-cultural Voyaging	PI	.1	2004-8
Anne Salmond	Between Worlds	PI	.1	2000-3
Billie Lythberg	Vā Moana	AI	.05/.05/.1	2019–22

Billie Lythberg	Tāngata Tiriti	PI	.3	2018–21
Billie Lythberg	Ancient Futures	AI	.2	2017–20
Billie Lythberg	Te Ao Hou	RF	.2	2016–19

c) Indicate whether any of the Principal or Associate Investigators are listed as named investigators on any other Marsden full proposals from this funding round.

Investigator's name	Proposal number (beginning with 20-)	Role (PI or AI)	Panel
Billie Lythberg	20-UOA-135	AI	EHB

d) Indicate any periods of leave to be sought during the period of proposed Marsden research.

Gary Brierley (Research and Study Leave, Semester 2 2021)
Dan Hikuroa (dates TBC)