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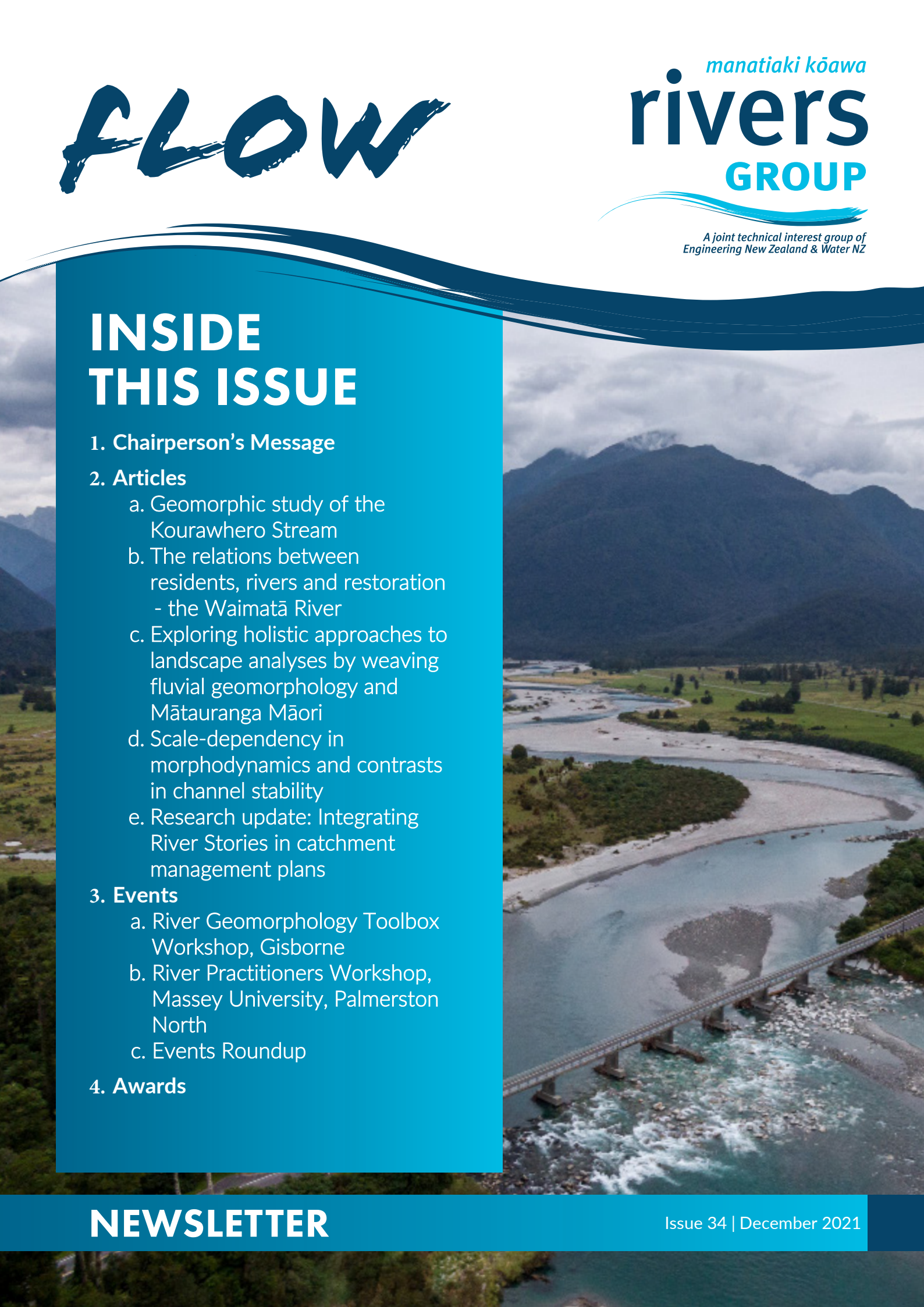

NEWSLETTER

Issue 34 | December 2021

FROM THE CHAIR

Heide Friedrich

We are now already in the last quarter of 2021, and lots is happening on the rivers front, with major flooding increasing awareness amongst the general public that river corridors are dynamic systems. The flooding highlighted the challenges we have when it comes to living with rivers as dynamic systems, and how a desire to control the river can do more harm than good. We have seen headlines of 'repairing the river' and 'putting the river back into its place', showing the diverse viewpoints on how rivers can be perceived. If you have an interest in promoting society to live with rivers as dynamic systems, a reminder herewith that our 2021 Annual Conference – now postponed to 2022 – is dedicated to the Room for the River philosophy. The conference will be held 27-29 April 2022 in the Lower Hutt events centre, and we aim to focus on the barriers of implementing Room for the River in Aotearoa. Please visit the website https: www.riversconference2021.co.nz, and note that early bird registration closes 25 February 2022.

For the 2019 RCEM conference, a Special Issue with the international flagship journal of Earth Surface Processes and Landforms (ESPL) is nearly ready to be published. For the New Zealand rivers community the excellent State-of-Science contribution from a team led by Murray Hicks is freely available to read here, outlining the various anthropogenic and natural pressures on our braided river systems in New Zealand. Two more New Zealand focused river-related papers can be accessed in full by contacting the corresponding authors, Ian Fuller and team documented changes in two adjacent badass gullies in Waipaoa catchment (Tarndale and Mangatu) to infer sediment generation processes and connectivity using a morphological budgeting approach, and Heide Friedrich and team outline river management challenges in the presence of large wood, and how experimental models can improve our understanding of complex large wood dynamics in river systems.

With this being my last chair message, and handing over the baton to our new incoming Chair Selene Conn, I want to thank the Rivers Group management committee for their fantastic contributions over the last three years. It has been a privilege to work with so many dedicated and enthusiastic river advocates, and I wish the committee all the best for the future. I also want to thank our Rivers Group members for your support over the years. Our membership is steadily growing, and the committee is working hard to engage through various ways with you, and to help with the challenges we face working together to promote good river management.

Thank you again to the people who sent us their articles to be published in this newsletter. We continue to look for contributions or articles you want to share (please email rivers.group@engineeringnz.org to submit your FLOW articles or any news). And keep checking updates and connect with us through our Website, Facebook, Twitter and LinkedIn.

Heide Friedrich
Chair (outgoing)

GEOMORPHIC STUDY OF THE KOURAWHERO STREAM

Jacqui McCord

In 2020, Auckland Council and the University of Auckland collaborated on a geomorphic study of the Kourawhero Stream, North Auckland. Although the Kourawhero Stream drains only 18.6% of Hōteo Catchment (74.3km² of 398km²), it generates and transfers more sediment to Kaipara Harbour than all other parts of the catchment combined.

In response, a major catchment-scale rehabilitation initiative is currently underway, co-funded by Auckland Council and Ministry for the Environment, to address sediment transfer. The project is delivered in partnership with local iwi from the Hōteo catchment, with a specific focus on Māori values and concerns for the ecological health of the system.

Location of the Kouawhero catchment.

Four students from the University of Auckland, under the supervision of Gary Brierley and Jon Tunnicliffe, undertook a River Styles assessment to understand the geomorphic characteristics of the river system and assess its evolutionary trajectory. Fieldwork to identify geomorphic features (with inevitable Covid constraints) accompanied the use of remote mapping tools to conduct catchment scale analysis.

Lower parts of the Kourawhero Stream in and around Kaipara Flats flow through valley fill deposits. Forest clearance and land-use change has altered the hydraulic regime of the river. Incision of lower courses of the trunk stream is propagating upstream via headcut erosion, generating a vast amount of sediment. Fine-grained sediments are readily flushed through the system. An application of the River Styles Framework identified 11 distinct river types shaped by the underlying geology, valley confinement and impacts from anthropogenic changes. Geomorphic mapping identified the extent of incision, indicating areas where sediment stores on the valley floor are available for reworking. These findings can inform proactive management solutions that work with the geomorphic processes operating in this catchment.

The study has helped Auckland Council to understand the catchment scale drivers of the river system and to incorporate this understanding into their Geomorphically Effective Management Solution (GEMS) framework. GEMS assess areas susceptible to geomorphic work by taking into account geotechnical and hydraulic resistance parameters and have been used to identify areas where river restoration strategies would be most beneficial in reducing sediment generation.

Management of the erosion in the Kourawhero is being carried out collectively with iwi and the community. Communicating the science of the river processes and management strategies to the iwi and the community is a key part of the restoration strategy and brings them along on the journey.

While the students will all attest to many late nights discussing the geomorphology of the Kourawhero Stream, the end result presented useful insights into the river system that are being used by Auckland Council in their management of the Kourawhero Stream.

Jack Clothier assessing the geomorphology of the Kourawhero Stream.

Jacqui McCord undertaking terrain laser scanning to assess fine grained geomorphic units within the Kourawhero Stream.

THE RELATIONS BETWEEN RESIDENTS, RIVERS AND RESTORATION – THE WAIMATĀ RIVER

Danielle Cairns. Masters thesis supervised by Gary Brierley and Gretel Boswijk (School of Environment, University of Auckland).

River restoration has commonly been perceived to be a purely physical science, measuring scientific and technical goals that define, and seek to address concerns for, 'river health'.

The effectiveness of restoration initiatives is entirely dependent upon how success is measured. As public engagement is a key component and benefit of restoration initiatives, surveys of societal relations provide critical baseline information with which to measure success. Without this information, prospects to generate evidence-based appraisals of the effectiveness of restoration programmes are limited.

My research investigated local relations to the Waimatā River in Gisborne, Aotearoa New Zealand. A mixed methods approach was used to understand what residents valued the river for, their connections to it, their concerns, perceptions of river health and aspirations for it and whether this varied spatially across the catchment.

The Waimata River

The Waimatā River flows through steep country to the city of Gisborne where it meets the Taruheru River to form the Tūranganui River. The river has rich local history significant to both Māori (indigenous people of New Zealand) and Pākehā (non-indigenous people of New Zealand). Its foreshore marks the landing place of Captain Cook in 1769 and the first meeting of Māori and Pākehā. Its history hasn't been free of conflict, as colonisation of the area by Europeans in the early 1800s influenced relations to the environment and between the two groups. Te Toka-ā-Taiau, a rock in the channel sacred to Māori and believed to hold mauri (life force), was blown up by the Harbourmaster to allow for the development of the Gisborne Port in 1877.

The foreshore of the Tūranganui River (lower Waimatā River) looking across Poverty Bay and the Gisborne Port. Credit: Jenny Cairns

Today land use in the upper catchment is predominantly forestry and sheep and beef farming. The river is in a poor state, suffering from high erosion and sedimentation rates, high nutrient and E. coli concentrations, low biodiversity, and severe flooding events.

A tributary confluence on the Waimatā River showing the high levels of sedimentation entering the river from forestry and agricultural land. Credit: Author's own.

The lower reaches of the Waimatā River/Tūranganui River following heavy rainfall. Credit: Jenny Cairns.

For the purposes of this research the catchment was divided into four groups (Figure below) based on geography and population in which respondents were identified by:

- The upper catchment, agricultural and forestry land
- The mid catchment, the transitional area between rural and urban land
- The lower catchment, Gisborne City
- Outside of the catchment (due to insufficient responses this was not included in spatial analysis of the catchment).

The location of the Waimatā catchment and study sub catchments.

Relations to the Waimatā

Geography and history are key determinants of how residents relate to river systems. Where residents lived within the catchment was found to shape their interactions with the river, how they valued it, what they perceived to be pressures on the it and their concerns and aspirations for the future Waimatā River. All respondents wanted to see improved water quality and swimmability.

Residents in the upper catchment that interacted with the river for work or agricultural purposes valued the river for its wilderness and aesthetic appeal. River health was perceived to be higher here than the rest of the catchment, likely due to compounded issues and the poorer environmental state of the river in its lower reaches. Water quality and forest clearance were the greatest concerns for the river. This is unsurprising considering the damage to infrastructure caused by forestry slash and erosion. Agricultural runoff was not perceived to be a pressure by the upper catchment; instead forestry and industrial processes were identified. Their aspirations aligned with their concerns, wanting increased forest cover and increased biodiversity.

The upper reaches of the Waimatā River. Credit: Chris Turner

Those in the mid catchment interacted with the river for recreational purposes, namely fishing, walking, and swimming and valued the river for its biodiversity and educational attributes. River health was perceived to be lower than by those in the upper catchment.

Water quality and erosion were the greatest concerns, many residents telling of the loss of land on their riverside properties following rainfall events. Agricultural runoff and forest clearance were perceived to be the greatest pressures. Many respondents here emphasised the responsibility of Gisborne District Council and other residents for the river's degradation. Residents in this area, the most likely to fish, wanted to see increased aquatic life and fishing potential in the Waimatā.

In the urban catchment, residents interacted with the river for recreational purposes (namely paddling sports, walking and swimming) and valued it for this and its scenic attributes. Perceptions of river health were lowest in this area of the catchment and respondents were most concerned by water quality and clarity – arguably a more aesthetic issue. As with the mid catchment, respondents believed agricultural runoff and forest clearance to be the greatest pressures on the river. Residents wanted to see increased scenic beauty and public education and awareness regarding river health. These aspirations were related to what they valued the river for and who they deemed responsible for river health.

A key connection between river health and public wellbeing emerged from this research, with 81% of respondents believing this to be the case. Residents spoke of the role of the river in their life, the joy it brought them to watch the sparkle of the water, its flows and ebbs, its wildlife and swimming in the water themselves. Some spoke of the benefits and grounding that meditating on the river provided. They also spoke of the shift in emotion they felt when the river was in a poorer state.

This was also linked to the cultural connection between people and the river stretching back to the 1300s when the Horouta and Tākitimu waka arrived. The Waimatā was considered part of their whakapapa (genealogy) and was embodied in the phrase "ko au te awa, ko te awa ko au" (I am the river, the river is me).

The obvious benefits exercising on the river had on physical health were also mentioned. Many respondents participated in rowing, kayaking and waka ama (outrigger canoe sport and part of Pacific culture) and spoke of how this kept them in physical shape. While these were positive, the concerning link between river health and physical health emerged. Waka ama paddlers recalled illnesses they had contracted from being exposed to the polluted water of the river, some resulting in hospitalisations. One resident recounted pulling a large item from the riverbed and finding it to be labelled hazardous waste from the local hospital.

The connections between river health and public wellbeing, positive and negative, highlight the importance of blue space and interactions with it. In light of this, there is a greater need for protection and restoration of river systems.

Relationality in River Management

So why are local relations so important in river management? Understanding how people relate to river systems can help in providing effective restoration. These relations and information provided by residents can help in determining the targets and goals of restoration, generating community interest and involvement, and help motivate individuals to contribute to the effort. By engaging residents in restoration and helping find these shared goals, long-term prospects for the success of restoration that rehabilitates and protects river systems are enhanced as people will likely take an interest in it. Restoration that is not designed with relations and social considerations means that positive impacts from restoration may not be sustained.

And simply put… "Everybody profits from a healthy river, everyone suffers if it is not useable".

EXPLORING HOLISTIC APPROACHES TO LANDSCAPE ANALYSES BY WEAVING FLUVIAL GEOMORPHOLOGY AND MĀTAURANGA MĀORI

Clare Wilkinson,[1, 2] Dan Hikuroa, [3] Angus Macfarlane, [4] Matthew W. Hughes [5]

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Many Indigenous knowledge systems have detailed understandings of landscape processes yet are largely unrepresented in geomorphological studies of Earth's surface. This work, as part of a doctoral research project, aims to promote and encourage the interweaving of multiple knowledge systems to better understand Earth's dynamic surface and peoples' relationships with it.

He Awa Whiria, a braided rivers framework for bicultural research, is applied to weave fluvial geomorphology and mātauranga Māori (the knowledge, worldviews, cultures, and values of Aotearoa New Zealand's Indigenous peoples) to better hear the story of Tūtae Putaputa/Conway River's response to the 2016 M_w 7.8 Kaikōura earthquake. Over 12 M m^3 of landslide sediment was coseismically released from hillslopes in the Tūtae Putaputa/Conway River catchment during the 2016 Kaikōura earthquake.

The sediment – and the cascading effects of coseismic sedimentation – has had impacts on the surrounding landscapes, both physical and cultural. Findings from fluvial geomorphology methods of sediment tracing (geochemical tracing of sands and physical tracing of cobbles) are woven with Māori perspectives of landscape change to investigate timescales over which landscapes heal following major disturbances.

Timescales of sediment conveyance, as well as intergenerational cultural knowledge of sustainability, adaptability, reciprocity, and connection indicate that understandings of landscape evolution may require more information that what can be gleaned from either body of knowledge – i.e., science or Indigenous knowledge – individually. Lessons from learning with and from Tūtae Putaputa and individuals from different iwi are leveraged to develop a trans-epistemologically informed landscape evolution concept for use in geomorphology. This concept—termed landscape co-becoming—builds upon formerly established concepts of sociogeomorphology and ethnogeomorphology and explores the interconnectedness of landscapes and all that inhabit them, including people and rivers.

Landscape co-becoming is an amalgamation of concepts present in geomorphology, social-ecological systems theory, understandings of ecosystem services, critical geographies, and Indigenous knowledge (Figure 1). It weaves nature-based kinship relationships informed by Indigenous knowledge systems together with connectivity of physical systems informed by science from the outset. The distinction of including both Indigenous knowledge and science in the concept of landscape co-becoming from the beginning is important for its development – landscape co-becoming has been informed by both knowledge systems since its conception, rather than being a pre-existing concept that has had space carved out of it to include another epistemology.

Landscape co-becoming has the potential to be a useable and useful tool in geomorphology, especially in Aotearoa New Zealand, where government policies relating to partnership with Māori, climate change resilience, and disaster risk reduction trickle down into the work that researchers and practitioners do. It is becoming increasingly important that industry and universities find ways to enable and empower Indigenous knowledge, and landscape co-becoming is one tool that may be useful for achieving this goal. In Aotearoa New Zealand, a place with myriad drivers of landscape change, having the means to evaluate potential landscape change within a bi- or multi-cultural worldview will become increasingly important as we continue to travel into an increasingly dynamic world. The concept of landscape co-becoming was the result of an exploration of existing frameworks and multiple knowledge epistemologies, aiming to offer a tool that may be used to better understand and predict the behaviour of dynamic landscapes in Aotearoa New Zealand and beyond.

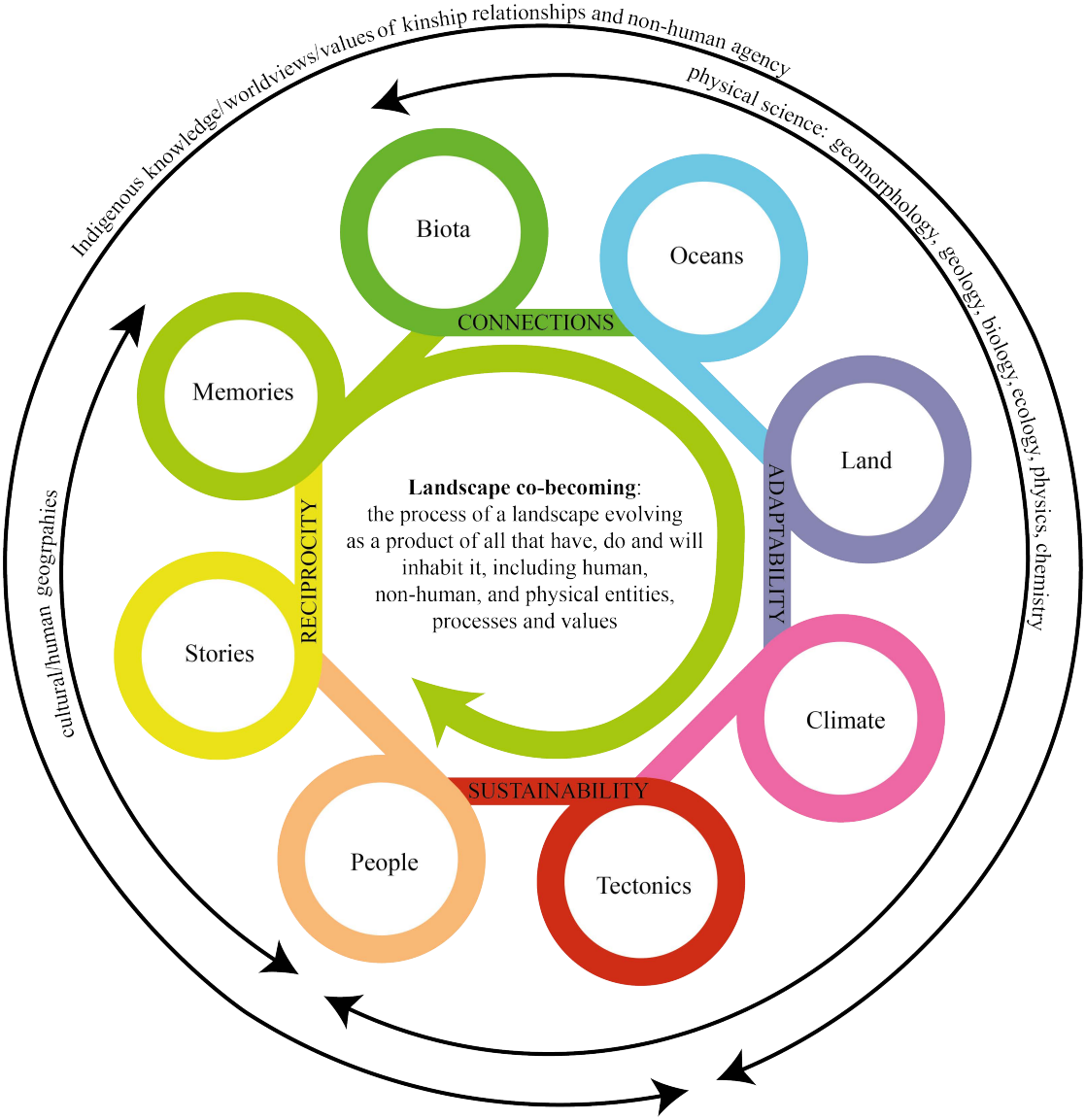

Figure 1: Landscape co-becoming as a conceptual process framework. Curved arrows indicate the spread of topics pertinent to, or typically explored in, the different ways of studying Earth's surface, identified by the text corresponding with each arrow. Sourced from: Wilkinson, C., 2021, Landscape responses to major disturbances: a braided mātauranga Māori and geomorphological study, Doctoral Thesis, University of Canterbury, Christchurch, NZ, 265 p.

SCALE-DEPENDENCY IN MORPHODYNAMICS AND CONTRASTS IN MANAGED RIVER CHANNEL STABILITY

Will Conley , PhD Candidate, Earth Sciences Group, Massey University
Principal, FluvioTec, LLC

Morphodynamics are the most important, but generally least understood component of managing alluvial rivers. Two critical areas of research include: 1) increasing understanding of human roles in fluvial geomorphic change by linking feedbacks between spatial scales (Gregory, 2006) and 2) establishing relationships for assessing future adjustment scenarios (Lisenby et al., 2020). While advancing understanding of any subject takes time, the complex interplays of geomorphic, hydraulic, and ecological processes across spatiotemporal scales moderates the pace in morphodynamics. Consequently, to keep up with socioeconomic aspirations, river management practice has spent the past two-hundred years racing ahead of morphodynamic understanding.

Having spent most of the past twenty-five years in that race as a practitioner, I'm keenly aware of the need to carry-on providing service while balancing the potential consequences of getting it wrong. Major technological advances over the last decade facilitate powerful data capture and analyses at the same time shifting climate boundaries and expanding land-use intensification create an imperative to reflect on practice. Though pressures on designers and managers often make reflection a luxury, there's never been a more important time to do so.

My Massey University PhD research in the Wairarapa region over the past few years has been a fantastic opportunity to explore multi-scale morphodynamics at a depth and breadth rarely afforded to designers and managers. In this article, I share some results from my thesis chapter (Conley et al., In Prep) that contrasts channel stability for the end-members of human river management: multidecadal and event scales.

The multidecadal evaluation considers riverscape-scale trends in active channel width for 15 km of the lower Waingawa River, a wandering, multi-thread, gravel bed tributary of the Ruamahanga River.

Since the early- to mid-1990s, the river has been managed in a fairway regime with an inner planform zone ("fairway") actively managed for low hydraulic resistance. An outer, vegetated "buffer", zone borders both sides of the fairway. Planimetric fairway boundaries are delineated by professional opinion informed by a mix of qualitative aerial photo review, benchmarked cross-sections, and regime equations. Frequent physical manipulations of channel form, location, and floodplain vegetation (e.g., groynes, channel 'blocks', cross-blading, and bar scraping) are used to "train" the river within the fairway. A time-series of active channel alignments digitised from a 69-year aerial photo record indicates trends of decreasing width (-48% mean) and increasing uniformity (-62% standard deviation) that converge on contemporary design widths (Figure 1). While comparison of within-year descriptive statistics was considered robust, poor coregistration of source imagery (root mean squared errors up to 89 m) prevented characterisation of absolute channel displacements between years (i.e. migration).

To facilitate spatially-explicit comparison between historic planforms and design lines, I generated orthoimages for 1963 and 1983 using high-quality scans (retrolens.co.nz) and structure-from-motion (SfM) processing. Three-metre (or better) coregistration to commercial orthoimages from 2012 and 2017 allowed robust comparison to the contemporary design fairway in GIS. Comparison indicated very general spatial correspondence with active belt form at coarse scales (e.g., 1:100,000), though multiple subreach-scale extensions outside the fairway boundaries existed in all years evaluated. These locations differed for each image and at no time was the belt consistently of single-thread form. In terms of exterior belt boundaries, the corridor might be qualitatively characterized as 'stable' at a very coarse scale.

To resolve mixed stability signals from the decadal record, I refined my spatiotemporal scope to a 3.5 km reach nested within the Waingawa's riverscape to better understand the system's sensitivity and non-linearity (cf. Lane and Richards, 1997).

Using rigorous geodetic control (cf. James and Robson, 2014) across four UAS surveys, I produced very-high resolution orthoimagery (0.05 m) and topography (0.10 m). Missions were interspersed between a series of mean-annual to smaller discharge events. Thresholding by an empirically-established excess discharge threshold (57 m3/s), revealed discrete, differential reach-scale stability (Figure 2). Morphological sediment budgeting (cf. Fuller et al., 2002; Brasington et al., 2003; Wheaton et al., 2010) exhibited up to 2.5 times more area normalised volumetric change for an event with peak discharge one-half the mean annual flood (MAF) and six times more for the MAF event (Figure 3). The two unstable reaches are spatially coherent with active channel earthworks performed within the prior 30 months and channels directly influenced by those works. Sediment pulses originate from mobilisation of channel (Reach 3) and floodplain (Reach 1) sediments in disturbed reaches, move through sub-reaches confined to a single channel, then gain (or create) access to broader areas. An intermediate zone of pulse translation occurs in both instances, however, the outcome is primarily dispersive (cf. Cui et al., 2003) at the reach exits. These areas experienced 30-50 m horizontal shifts of the low-flow channel and lateral bank erosion up to 16 m during the MAF epoch.

Considered together, results from these two scales provide a novel juxtaposition of river management effects. The multidecadal narrowing of the active belt reflects a general consistency with channel management aims and is very likely aided by training operations. By contrast, disproportionately large morphological changes in recently trained reaches implicates actions of the same management regime as destabilising. This antipattern indicates how interventions that support aims at one scale may amplify morphodynamic response and subvert stability aims at another scale. Moreover, amplified changes associated with high-frequency, low-magnitude discharges can condition channels between large floods (sensu Naylor et al., 2017). Thus, reduced stability during routine peakflows similarly reduces certainty of how a channel will respond to a flood at any point in time.

It also increases the likelihood that training actions will create a need for more training. These results provide an important nexus for reviewing rules-of-thumb and operational conventions accepted as common knowledge though they may never have been objectively validated. The imperative is further underscored by the non-linear responses of river system components that should be anticipated in response to ongoing shifts in boundary conditions (i.e., climate change).

Aside from action-effectiveness implications, my research also daylights some of the latent uncertainty and human-causality present, but unaccounted for in much NZ river data of the past 50 years. For example, the prevailing tendency to infer changes in time-series of benchmarked cross-sections as resulting from 'natural' river processes should likely be more tempered and cautiously framed. Broader and deeper examination of human roles in instability, traditionally dismissed as a river-just-being-a-river, not only improves our understanding of the past and present but improves prospects for resilient riverscapes and sediment transport prediction in the future.

Given all the above, I close with a question: is stability even the appropriate concept for protecting floodplain development? Or, is certainty actually more relevant? I argue for the latter. Though engrained, stability is an oversimplified proxy for certainty which originated during an era of low morphodynamic understanding founded on linear assumptions and crude spatiotemporal averaging. Continued use of such legacy framing confines future management to an arbitrarily small box without room for contemporary knowledge. Re-framing aims as a matter of certainty offers greater potential to express river behaviours in a probabilistic context that informs forward-looking management strategies that are better suited to anticipate and adapt to future conditions.

Acknowledgements: I thank my supervisors Prof. Ian Fuller, Dr. Sam McColl (Massey University), and Dr. Jon Tunnicliffe (The University of Auckland) for their contributions to this work; Greater Wellington Regional Council for funding; Menno Diersmann assisted field collection.

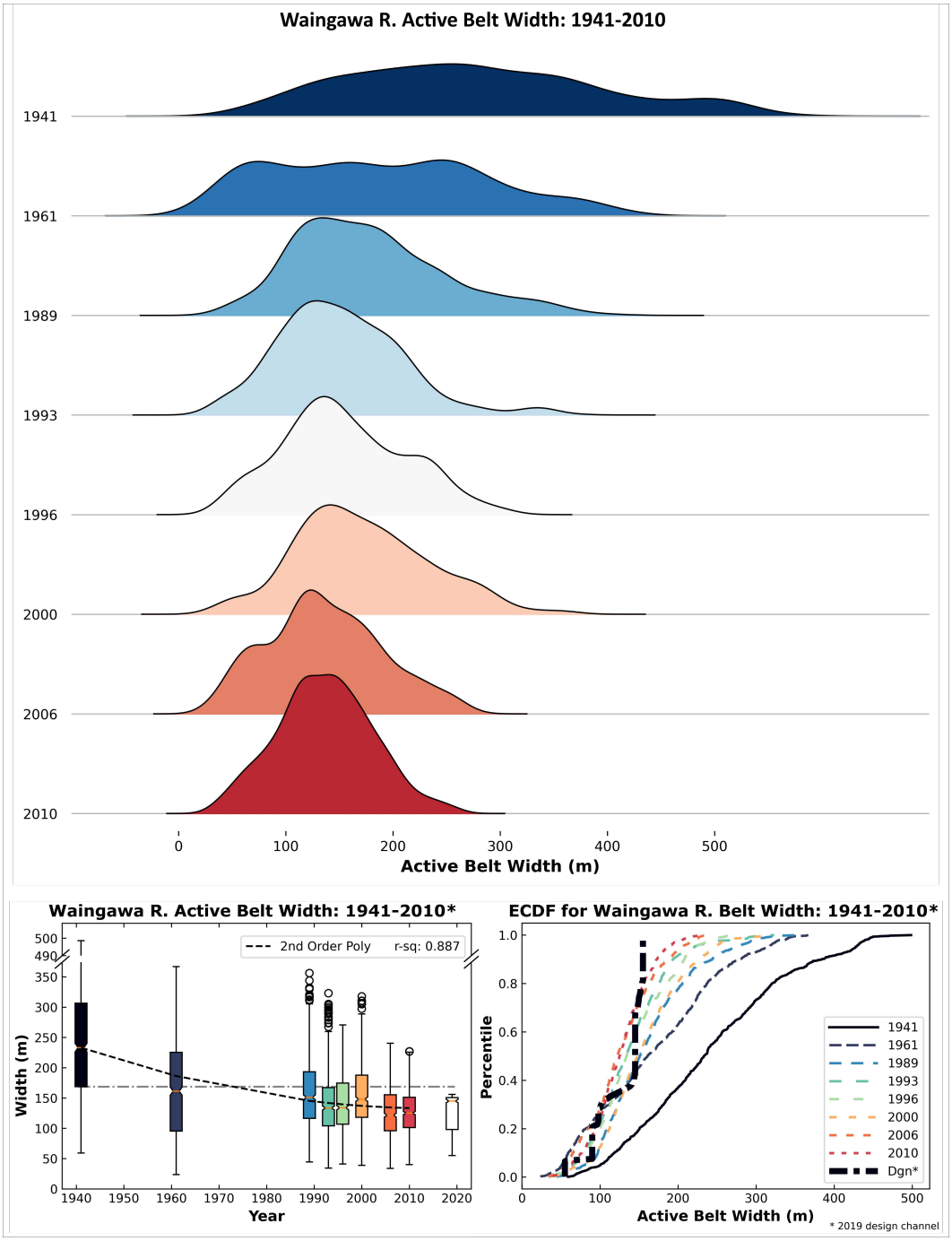

Figure 1. Mean active belt widths by year. Top: Ridge plot shows statistical distribution of witdhs by year and generally indicates narrower means (shift to left) with a tighter and more uniform distribution through time. Left: Measures of central tendency, range and interquartile range of belt width diminish through time with 2nd-order polynomial regression showing a convergent relationship on 2019 design width (white box). Right: Empirical cumulative frequency (ECDF) plots (using same colour coding as left plot) show truncation and steepening consistent with trends in box plots; an ECDF of 2019 fairway design widths is overplotted for reference.

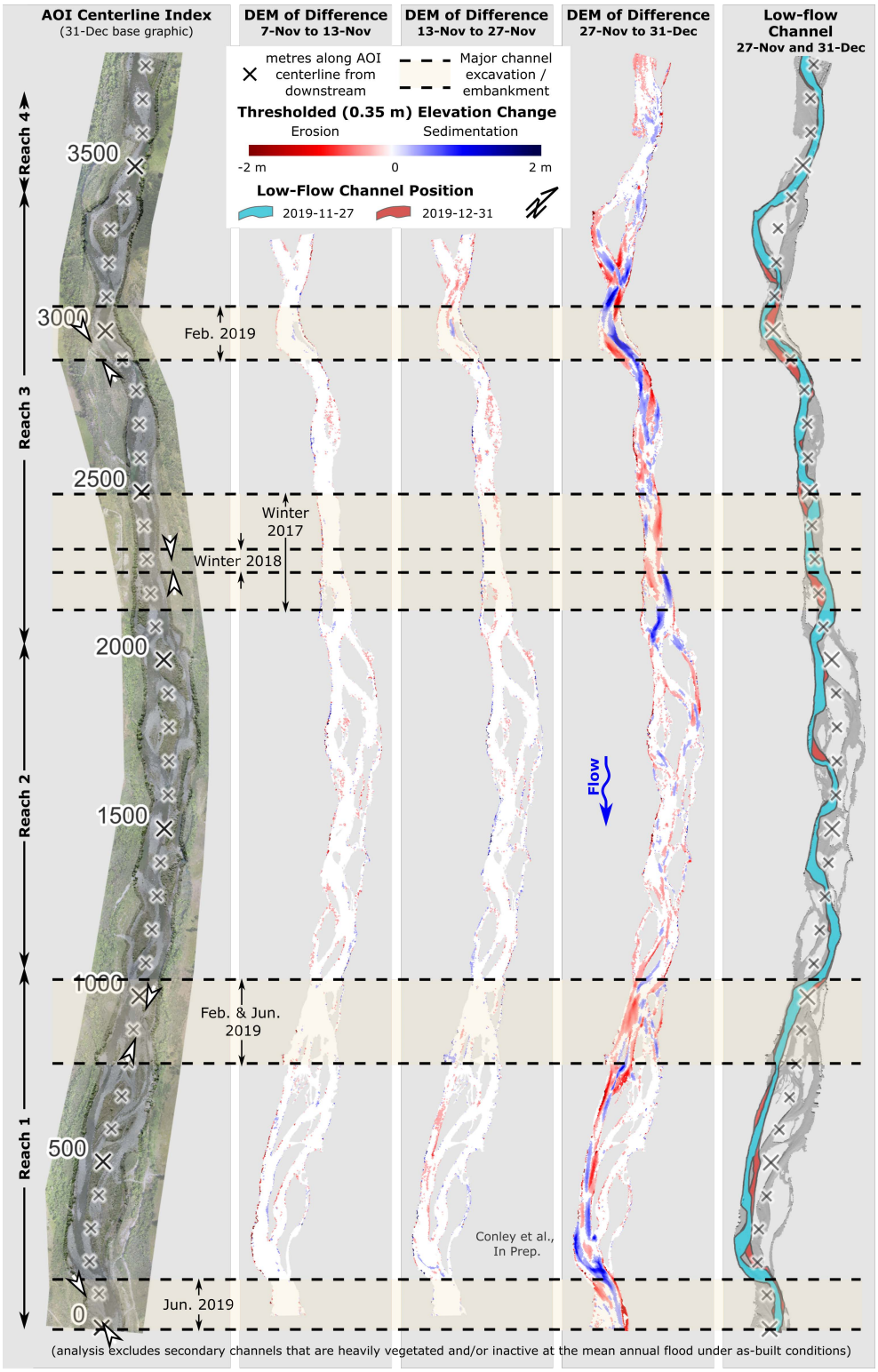

Figure 2. Change in the segment AOI with index (left), DoDs by epoch (middle three panels, labeled accordingly), and primary wetted channel alignments (right). Horizontal zones delineate areas of mechanical treatment with white arrows indicating berms constructed to block secondary channels.

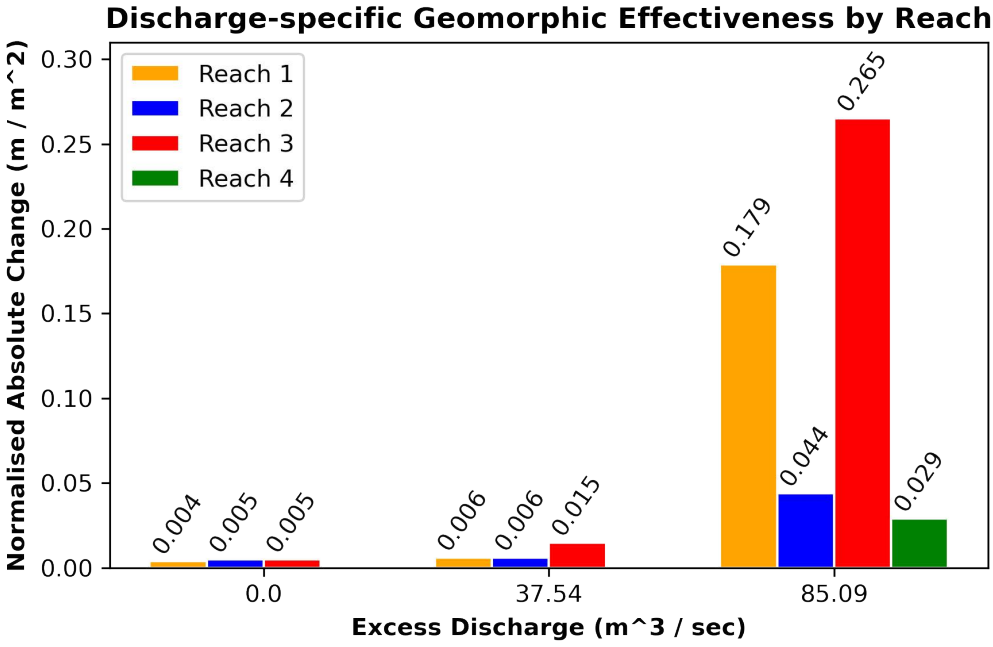

Figure 3. Geomorphic effectiveness by reach for three different time-integrated events with 0.0, 37.54, and 85.09 representing epochs one (7-13 Nov.), two (13-27 Nov.) , and three (27-Nov. to 31-Dec.), respectively. Recent training operations occurred within reaches 1 and 3. Excess discharge is the total discharge above threshold (57 m3/s) occurring during an epoch divided by the total duration of excess discharge for that epoch.

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RESEARCH UPDATE: INTEGRATING RIVER STORIES IN CATCHMENT MANAGEMENT PLANS

Elliot Stevens, Gary Brierley (School of Environment, The University of Auckland)
Dan Hikuroa (Māori Studies, The University of Auckland)

This research analyses how and why principles from landscape science (fluvial geomorphology) provide a complimentary framing and communication tool to support a shift in catchment-wide management and planning applications that incorporate prospects to promote river stories. River Stories are personal, social or cultural narratives or stories associated with a particular river or catchment. They communicate valuable information about the river, which may otherwise be ignored or forgotten. Drawing on multiple knowledge bases and data sources, we seek to expand prevailing dimensions of catchment management to establish a workflow that benefits all river systems.

A case study application in the Waimatā River catchment (Gisborne) relates geomorphic understandings of river diversity and process-based linkages (assertions of a 'Digital River' sensu Brown & Pasternack, 2019) to qualitative data sources and local knowledge bases in the form of river stories. We argue that a holistic lens provides a platform to move beyond dualistic assertions of land and water management, providing a coherent and integrative information base that account for politics, the public, mātauranga, science, industry and most importantly, the Voice of the River itself (Brierley, 2020; Salmond Brierley et al., 2019).

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EVENTS AND AWARDS

River Geomorphology Toolbox Workshop, Gisborne

Prof Ian Fuller and Dr Sam McColl from the Environmental Sciences Group at Massey University ran a workshop aimed at equipping community personnel with monitoring skills and establishing some baseline assessment of geomorphic condition for streams in the Waingake water catchment in early June 2021. The Toolbox was developed by former Massey University Masters student, Terryll Lepper, originally to run alongside Waikato Regional Council State of the Environment monitoring.

A 2-hour overview seminar was run in the afternoon of 1 June to explain the toolbox and monitoring and introduce the approach to be utilised in the field. Sixteen participants drawn from GDC, Ernslaw One, consultancies and iwi groups participated in the workshop.

The second day was based in the field at Waingake:

Prof Fuller led field-based instruction on the application and deployment of tools within the toolbox at the Waingake River. This was run to two groups of ~ 8 people in the morning (GDC staff & consultants) and afternoon (iwi), to cater to participant availability. Instruction was provided on use of rudimentary equipment, site monitoring protocol and overall approach to measuring baseline river condition (geomorphology). This field exercise provided opportunity for the groups to see techniques used in practice and to ask questions relevant to their own context of application.

Dr McColl supported GDC staff to install survey benchmarks for monitoring further upstream at strategic sites to assess the potential impact of land-use change on sediment in the Waingake River and tributaries. In addition to monumenting benchmarks and ground control points, initial 'proof of concept' photography was taken for use in Digital Surface Model construction using Structure from Motion (SfM) Photogrammetry, which will be used as part of the monitoring of river condition (alongside the river geomorphology toolbox) at the monitoring sites within the catchment.

The morning of day 3 (3 June) provided an opportunity to run a seminar on SfM photogrammetry processing, which was led by Dr McColl. The purpose of this seminar was specifically to introduce GDC staff to the software and workflow used in SfM analysis so that they can either run the photogrammetry processing themselves.
We would be very happy to run similar workshops for interested groups around the country. Please contact Ian: i.c.fuller@massey.ac.nz

River Practitioners Workshop, Massey University, Palmerston North

This year's River Practitioners Workshop, run over 15-16 June by Profs Ian Fuller and Russell Death, Innovative River Solutions, Massey University, was attended by 16 practitioners from around the country, drawn from Regional Councils and consultancies. The purpose of the workshop is to introduce the key processes driving river behaviour in New Zealand. Our premise is that understanding these processes is key to working with them, rather than against them. In turn, working with the dynamics of the river is critical for effective and sustainable river management, to reduce the risks of failure and loss of infrastructure and capital, and improve the aesthetics and habitat of managed river reaches.

Having introduced key river processes and the intersection with ecology, the workshop concluded with an afternoon providing participants the opportunity to discuss particular issues and sites that are being worked on. Feedback on the event indicated the workshop was a successful mixture of interesting, relevant topics with good opportunities for discussion. A key highlight was simply bringing people together to talk and connect.

We plan to hold the next workshop in June 2022 if there is sufficient demand. Expressions of interest to Ian: i.c.fuller@massey.ac.nz

2021 EVENTS ROUNDUP

Despite COVID-19 and the emergence of the Delta Variant, we were still able to hold two in person events this year, and we look forward to seeing you at our conference in April.

We plan to seek feedback from our members on what event and webinar topics they are most interested in for 2022 and beyond. Look out for our member survey in the coming months.

Picture a Scientist

In March the Rivers Group supported a special event - a screening of "Picture a Scientist". Big thanks to Selene Conn (our incoming Chair) for organising this.

This feature-length documentary film chronicles the groundswell of researchers who are writing a new chapter for women scientists. A biologist, a chemist and a geologist lead viewers on a journey deep into their own experiences in the sciences, overcoming institutional discrimination, and years of subtle slights to revolutionize the culture of science. It was accompanied by a panel discussion on positive action for increasing diversity in STEM and leadership. The audience heard about what people and organisations have done to tackle inequality, and uplifting moments in careers where equality 'barriers' were overcome.

We were proud to support this event and raise the profile of our female science leaders to encourage diversity in our profession.

River Practitioners Workshop 2021

In this workshop facilitated by Professors Ian Fuller & Russell Death, Innovative River Solutions Group, School of Agriculture & Environment, we will introduce the key processes driving river behaviour in New Zealand. Our premise is that understanding these processes is key to working with them, rather than against them.

New Zealand river managers and engineers are tasked with working in some of the most dynamic river systems in the world. Sudden and rapid changes in these channels can render control and modification structures redundant, threaten their integrity, or undo months of river control work. In this workshop practitioners shared case studies, and learnt about the fundamentals of geomorphic and ecological processes governing our river systems.

With Massey's University placing less emphasis much of their practical geomorphic programmes (due to COVID-19 related financial challenges) the Rivers Group will be seeking new opportunities to work with Academics and the River Managers Group to make learning available in this field in 2022 and beyond.

Webinars

This year marked our most successful webinar series ever. Even better, all of these webinars were recorded and are available on the Members Area of our website. A broad range of presenters delivered high quality webinars on the following topics:

- Steve Glassey – Flood Recue Emergency Planning
- Emily Lane - Mā te Haumaru ō te Wai: Towards a more flood-resilient Aotearoa/New Zealand
- Thomas Kay – Droning on about rivers
- Gu Stecca & Richard Measures – The impact of exotic vegetation in braided rivers
- Kyle Christensen - The evolution of river width design for gravel rivers
- Ian Fuller – Rivers & climate change: resilience, floods & tipping points

Thanks so much to all of our presenters! To our members, please send through requests and suggestions for webinars and events!

We don't have any webinars lined up for the rest of 2021, but you may be interested in the following:

- Australian Water School is producing a great body of webinars with recordings available https://awschool.com.au/
- On 6 December see Rebuilding and Developing Samoa's Hydropower... | Engineering New Zealand (engineeringnz.org)

For 2022

- We will aim to deliver another 6+ high quality webinars. We will plan to run these at lunchtime on the last Wednesday of the month Feb to November.
- We will place increased emphasis on working with ENZ branches to promote and host 'hybrid' events to improve our reach into the regions and offer more networking opportunities.
- We will work with River Managers Group, ENZ, and other Technical Groups and Academics to develop more course material and in-depth learning opportunities.
- We have had various requests for short courses covering Hydrology, Flood Response, Flood Forecasting, River Works Design, Wetland Design, River Restoration and Natural Channel Design.
- We also plan to seek feedback from our members on what event and webinar topics they are most interested in for 2022 and beyond. Look out for our member survey in the coming months.

AWARD RESULTS

Since it was established in 2009 the Rivers Group has presented the Arch Campbell Award to recognise notable contributions to the advancement of knowledge or practice in the fields of catchment hydrology, catchment management or river engineering. This Award was established in memory of Arch Campbell to recognise his very significant contribution to soil conservation and river control and management in New Zealand and has generally been presented to experienced practitioners who've made a major contribution over an extended portion of their career.

This year two new awards have been added. The early career award is presented for contribution to sustainable management of New Zealand rivers within the first 10 years of someone's career, and the Wahine Toa award celebrates a female role model who is leading the way in a river related field. There is a cash prize of $500 for both awards.

The award winners were announced during the online AGM of the Rivers Group on 17 November and the awards will be presented in person during the conference dinner of the postponed Making Room for Rivers conference in Lower Hutt in April.

Early Career Award: Emma McFarlane

Emma is a water resources engineer at Tonkin and Taylor, with 5 years of flood risk and three waters infrastructure experience. She is currently undertaking flood protection and river planning and policy work as part of a secondment to Tasman District Council as a Stormwater Planning Advisor.

Emma was nominated for her significant contribution to the Motueka River Levee Refurbishment project. She has been involved from the initial stages of the work, through to assistance with applying for shovel-ready funding, and on into construction (which is ongoing).

Emma was responsible for developing a risk register that used a robust, defendable and repeatable risk assessment methodology to identify and rank risk, enabling the development of a prioritised programme of works. She carried out calibrated hydraulic modelling of the river to understand the existing capacity and level of service, and combined condition assessment information with overtopping likelihood and consequence information, to locate likely breach locations and map resulting flood extents. She based her work on the Flood Protection Assets Performance Assessment Code of Practice, published by the River Managers Forum. To promote best practice and share her learnings about the tool she prepared a presentation for the rivers managers forum.

Emma's logical and systematic approach to understanding the river constraints and risk assessment meant that the river reach could be broken into manageable packages of work. The web map which she developed to streamline collaboration proved valuable to communicate the importance of the work to stakeholders and facilitate cross-disciplinary discussion.

Emma also has a strong commitment to te tiriti and te mana o te wai, and is currently learning te reo me ngā tikanga Māori to ensure her work on our rivers honours te tiriti and Te Ao Māori.

Emma has a bright future ahead in river engineering and is a worthy winner of this award.

Wahine Toa Award: Jo Hoyle

Jo is a true multidisciplinary river specialist. After completing a natural resources engineering degree at University of Canterbury Jo started her river career as a river engineer for MWH in the Tasman District. She then completed a PhD in river geomorphology at Macquarie University in Australia before moving to NIWA Christchurch in 2008. Jo has been the Group Manager of the Sediment Processes group since 2012. Jo is a founding member of the NZ Rivers Group, and served on the NZ Rivers Group committee for seven years (2013 – 2020).

As one of a limited number of practicing geomorphologist in New Zealand, she is one of the few senior women in this field. Jo is highly visible in her role, presenting confidently and knowledgeably at numerous conferences, publishing research and whitepapers, and undertaking numerous consultancy projects for a diverse range of clients. Jo's work has been fundamental to furthering our knowledge and understanding of how our unique braided rivers evolve through time. Jo's work is also fundamental in advancing the connection between river processes and river ecosystems, and the recognition that not all rivers are alike. In particular, her research on the mechanisms for periphyton removal in gravel bed rivers has enhanced our understanding of periphyton management in New Zealand. She demonstrated why a single flow metric may be a poor predictor of periphyton abundance across different rivers types in New Zealand, and that prediction of periphyton disturbance or removal flows can be improved by using flow metrics that relate to sediment mobility.

One of Jo's many strengths is her multi-disciplinary view of river management, working as a team with ecologists and other experts to deliver high quality science. An example of this is her leadership of NIWA's extensive consultancy work for Meridian Energy, delivering multi-disciplinary science to help them identify and mitigate the impacts of their major hydropower schemes.

Jo is well connected across the country within the River community. She is always up for a chat, willing to help other professionals and never has a bad word to say about anybody. This kind of inclusive and supportive behaviour within a small and close-knit industry is what makes Jo such a fantastic industry leader and role model.

Arch Campbell Award: Brendan Paul

Brendan has been at the forefront of floodplain management practice within New Zealand for almost 35 years, ensuring that Greater Wellington Regional Council has become a leading local authority in addressing flood risk via a floodplain management approach. The Otaki, Waikanae, and Hutt River Floodplain Management Plans are legacies of his work and leadership in this field. Each has been based on a sound and wide-ranging programme of technical, environmental, and social investigations to establish the full context of the flood risk in each of those floodplains. Brendan had the foresight to see that such investigations were needed, and the stamina to see options thoroughly investigated and consulted upon, plans prepared and adopted by political leaders, and implemented on the ground.

After graduating from Lincoln with a degree in agricultural engineering, Brendan joined the Wellington City Council, working in water supply. Here he developed his hydrology skills. Brendan had an OE where he worked in Ireland, before returning to NZ in 1985 and working with Beca.

In 1986 he joined the Wellington Regional Council as Design Engineer with the then Rivers Control Department. Here work began on a review of the Hutt River Flood Control Scheme. That review was to eventually morph into the Hutt FMP, although not without significant distractions such as the Ewen Bridge flood protection works and rapid development in the Kapiti Coast, which required development of the Waikanae and Otaki FMPs. During that time, Brendan showed doggedness in ensuring development proposals didn't exacerbate flood risk and wouldn't be exposed to unacceptable risks in the future. He was also a supportive mentor for his staff, allowing them to learn and grow, and being willing to listen and delegate where appropriate.

In 2003 he left GWRC for Ireland, where he again worked in the flood management field. After his return he joined DamWatch as Business Development Manager, although in practice much of his work was back as a consultant to GWRC, progressing further design investigations during the implementation of the Hutt FMP. More recently he has returned to the council to assist with the River Link project.

His passion for his career, willingness to discuss flood and FMP issues, and his local knowledge for the Hutt in particular, have contributed greatly to floodplain management in NZ and make him a worthy winner of the 2021 Arch Campbell Award.

CALL FOR CONTRIBUTIONS

For our newsletter FLOW we are always looking for articles from our membership. Please consider submitting an article, case study, update or notice for the next issue of FLOW.

Issue	#	Deadline for contribu ons
March 2022 issue	#35	Monday, 14 February 2022
June 2022 issue	#36	Monday, 16 May 2022
September 2022 issue	#37	Monday, 15 August 2022
December 2022 issue	# 38	Monday, 14 November 2022

Please format your contribution as follows:

- Length of 500 – 1500 words, in Microsoft word format (Articles should include name of the author(s), affiliation, titles and section headings and illustrations are strongly encouraged)
- Attach images in jpg (file size 300KB-1MB) and at high-resolution separately
- Provide credits and captions for your images

If you have articles which are longer, please email us.

Please email rivers.group@engineeringnz.org to submit your FLOW contributions. We look forward to receiving your contribution.

RIVERS GROUP MANATIAKI KŌAWA MISSION STATEMENT

The New Zealand Rivers Group Manatiaki Kōawa was formed in 2009 to provide a forum for 'Working together to promote good river management'. It is a place for people with an interest in rivers, flood risk management and the operational and environmental issues of catchments and river systems to come together.

We currently have over 300 members, and promote a multi-disciplinary approach to river management, reflecting cultural and societal diversity in an integrated and holistic manner. Our membership reflects this, with our members coming from a wide range of river management, science and engineering, and planning backgrounds - working as consultants, or in local, regional and central government, research institutes and universities.

New members can sign up here.

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