manatiaki kōawa

rivers GROUP

A joint technical interest group of Engineering New Zealand & Water NZ

INSIDE THIS ISSUE

NEWSLETTER

Issue 24 | December 2018

FROM THE CHAIR

Mark Hooker

This will be the last Chair's Message from me. I am stepping down from the role, and the committee, as I am moving to Germany in January with my family. It's a great opportunity and adventure for us but it's with some sadness that I leave the role as Chair after one year. Our Deputy Chair, Heide Friedrich, will step into the breach and she does so with the support of a passionate, experienced and capable committee. I will remain a member and will look forward to staying in touch from afar.
It has been a great year for me as Chair and for the Rivers Group. Highlights included:

- A great conference in Palmerston North (see report elsewhere in this newsletter)
- Developing a clear statement of our own identity and working with Engineering New Zealand as they overhaul their approach to technical groups
- A stronger online presence, including a new website and implementing a Members' Only Area
- Expanding our reach through holding events jointly with other groups or with support from other organisations
- Unsolicited feedback from colleagues and other members on the quality of the newsletters!

One thing I wish we had been able to do was to hold more regional events in a range of locations. Usually this just requires someone to put up their hand to organise it, then the offers of venues, presentations (and sometimes sponsorship for food and drink!) seem to flow in. This doesn't sit just with the committee to organise, especially in locations where we don't have a local presence, and I'd encourage members to volunteer to organise an event.
I'd like to acknowledge Sjaan Bowie and Catherine Knight , who both stood down from the committee at our AGM. Thanks to both of you for your contribution. I'd also like to welcome our new committee members Jon Bell, Amanda Death, Trevor James, Verity Kirstein and Phil Wallace.
The committee already has exciting plans for next year, including a workshop in the Bay of Plenty in April and our November conference in Auckland. We're also looking at opportunities for one or two-day short courses that we can either put on or support. Keep your eyes open for more information on these and other opportunities. And if you have an idea, please let a committee member know or email rivers.group@engineeringnz.org.

I wish you all the best for the holiday season and the New Year.

Mark Hooker
Chair

MEET THE COMMITTEE

Sarah Basheer

Tonkin & Taylor, Auckland

Sarah is a Water Resources Engineer at Tonkin & Taylor in Auckland. Sarah's 8 years' experience is in river engineering, with a focus on flood hazard identification and assessment through hydrological and hydraulic analysis. Sarah's experience ranges from hydrological and hydraulic modelling for urban and rural rivers, streams and stormwater systems, to design of flood protection schemes and erosion control works. It also includes assessment of sediment and gravel movement and their effects on channel capacity, as well as flood damage assessment and flood risk analysis. Sarah has been a member of the rivers group since its inception in 2009 and has recently joined the committe.

COMMITTEE UPDATE

At the AGM the 2019 committee was elected . We have new Chair Heide Friedrich from Auckland University. Heidi follows Mark Hooker who is literally our departing Chair for Germany. We thank Mark for his stirling work during the year and as the primary driver and organiser for this year's Conference. Two other committee members have stood down this year : Sjaan Bowie and Catherine Knight. Sjaan has made significant contributions to the organisation over the past 4 years and her input will be missed. Catherine has brought a new perspective to the committee during the year from river historian viewpoint . Unfortunately Catherine has had to stand down for work load reasons. Catherines' addresses to the Rivers' group functions in the Manawatu and to our Conference this year provided great insights into the history and importance of our river systems to our economy and our environment . We thank you both for your contributions.

Our new committee members are:

Amanda Death
Trevor James
Philip Wallace
Verity Kirstein
Jon Bell

Indicative tasks have been assigned to the committee as follows:

Name	Location	Role
Heide Friedrich	Auckland	Chair
Laddie Kuta	Christchurch	Co-Chair
Selene Conn	Tauranga	Communications - Facebook
Kyle Christensen	Wellington	Conference Liaison
Verity Kirstein	Christchurch	Membership
Brian Kouvelis	Palmerston North	Communications - Newsletter
Trevor James	Nelson	Other non-RG event outreach and engagement
Amanda Death	Wellington	Regional Events
Graeme Campbell	Wellington	River Managers Liaison
Will Conley	Palmerston North	Student Liaison
Phil Wallace	Wellington	Treasurer
Vicki McEnaney	Auckland	Water NZ Liaison
Sarah Basheer	Auckland	Communications - Website
Jo Hoyle	Christchurch	
Jon Bell	Palmerston North	

The committee portfolios and activities will be finalised at the face to face meeting in February

ABOUT THE EngNZ RIVERS GROUP

The Rivers Group was formed in 2009 to provide a forum for those involved with, and with an interest in rivers, flood risk management and the operational and environmental issues of catchments and river systems.
The Group incorporates a wide variety of fields and of practice and interest to do with rivers, including cultural health, water quality, water quantity, flood management, energy generation and environment protection, as well as promoting a multi-disciplinary approach for river management, that reflects cultural and societal diversity in an integrated and holistic manner.

Objectives

Key objectives of the Rivers Group are:

1. To facilitate cross-disciplinary interaction between individuals, communities and professionals involved in catchment management, flood risk management and river management throughout New Zealand;
2. To promote best practice, leadership and the sharing of technical knowledge in all aspects of catchment management, including flood risk management, river restoration and river engineering throughout urban and rural environments in New Zealand;
3. To support and promote relevant science and research in river and catchment management and to disseminate that information among professionals, academics, decision makers and the general public;
4. To promote and facilitate input into local and central government policies, strategies, standards and programmes affecting catchment and river management;
5. To assist in the integration of the principles of the Treaty of Waitangi in best practice river management.

Check out our new website
Our website link is: https://riversgroup.org.nz
For all events click on this link: https://riversgroup.org.nz/events/

ARTICLES

The long road to planning for natural hazards - Reflections on Mangaroa

Sharyn Westlake (Greater Wellington Regional Council)

Greater Wellington Regional Council (GWRC) has policies relating to identifying, assessing and communicating flood risk in the Regional Policy Statement for the Wellington Region 2013. This work is carried out through the GWRC Flood Protection Department investigating flood hazards and making the resulting information available to the people, communities of the region and the Upper Hutt City Council to provide input into statutory processes (district plan changes and notified resource consents).

The rural, sparsely populated Mangaroa River valley in Upper Hutt is under increasing development pressure due to its proximity to the city. Gaining community recognition of the flood hazard so the hazard can be avoided, or management measures implemented, has been a process that has experienced a number of pitfalls along the way. This paper outlines our reflections about the challenges encountered with taking flood hazard information to the community and putting in place statutory measures for flood hazard management for the Mangaroa River.

Introduction

The Mangaroa River catchment, within the Greater Wellington Region in the lower North Island of New Zealand has an area of 101 square kilometers. Figure 1 shows the location of Mangaroa River catchment and direction of water flow. The main river channel is 20 kilometres long and 1% Annual Exceedence Probability (AEP) flow of 475 m3/s (Jacobs, 2015).

The Mangaroa River valley has a small dispersed population, and due to its proximity to the city of Upper Hutt has been under increasing development pressure. This has provided impetus to identify flood hazard from the Mangaroa River and put planning measures in place to manage the flood risk.

For the Mangaroa River Valley, identifying the flood hazard, communicating this with the community, developing the proposed planning measures and putting them in place has taken about 12 years, which is longer than anticipated for such a process, and was certainly not expected at the start. Reflections on the pitfalls encountered along the way are developed and these include issues encountered around engaging the community, explaining and interpreting information.

Figure 1: Location of Mangaroa River and catchment showing Mangaroa River and Hutt River flow directions

Note: This is a condensed version of the paper that was presented at the Floodplain Management Australia Conference in May 2018. If you would like to see the full paper please click here.

Conclusions

Like many rural areas, the Mangaroa River valley is subject to increasing development pressure resulting in a need to manage flood risk through appropriate development rather than creating a need to provide future protection for poorly-sited development.

Managing natural hazards in the Mangaroa River valley is a function of GWRC and UHCC, while land use planning sits with UHCC. The process of carrying out flood hazard modelling and mapping for the Mangaroa River floodplain has taken place using two hydraulic models and two plan change processes over 12 years. The times involved and differences in technology that required new models to be built haven't helped this timeframe.

Key messages resulting from the process, to enable such pitfalls to be avoided, are as follows:

- The process followed when disseminating flood hazard information is important and the community should be bought into and given ample opportunity to participate.
- Some people are never going to be satisfied or happy about what you are trying to achieve, and they will remain critical of any consultation process.
- Including freeboard in flood hazard modelling is best practice, and this should be included.
- Consistency in terminology is important
- Peer review of flood hazard modelling and mapping is essential.
- Provide guides (to mapping etc.) to help people understand what the information means.
- Finally, people want to be involved in processes and understand the implications, especially where they consider that they may impact their property rights, development potential and perceived property value. While it may be challenging and time consuming, it is increasingly important that we work with communities, so they make good decisions about flood risk management to reduce the potential burden on future generations

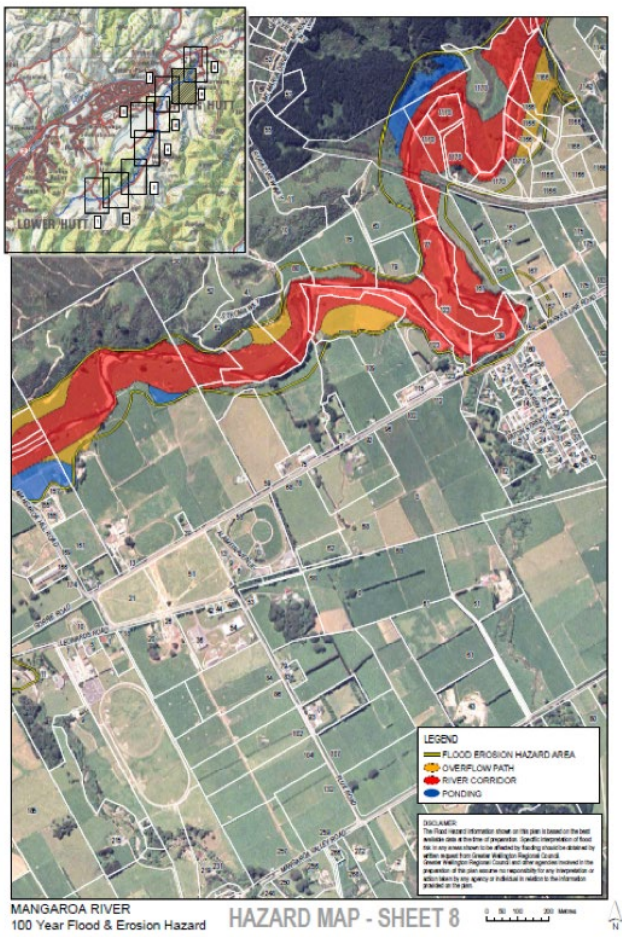


Figure 2: Flood Hazard Map Mangaroa Catchment

Note: This is a condensed version of the paper that was presented at the Floodplain Management Australia Conference in May 2018. If you would like to see the full paper please click here.

ARTICLES

Ōtaki Flood Damages Assessment

Mark Hooker (Greater Wellington Regional Council), Nuno Jeronimo (DHI)

Introduction

As part of its review of the Ōtaki Floodplain Management Plan, Greater Wellington Regional Council (GWRC) made a flood damages assessment to assess the effectiveness of the physical works (to date) in reducing flood damage in Ōtaki. The questions to be answered were "what are the potential flood damages today, and what would they have been in the absence of the works?" Those physical works included new and upgraded stopbanks, a wider river fairway and floodgate improvements.

The flood damages assessment involved adapting an existing hydraulic model of the river and floodplain to best represent the pre- and post- works situations, then using the Riskscape software produced by GNS and NIWA to analyse the resulting damage to building assets on the floodplain.

The emphasis of this work was on urban damages as this was the focus of the protection works. Rural damages besides buildings have not been allowed for. The previous damages assessment carried out in 1992 found that rural damages were only a small component of the overall damages.

Hydraulic modelling and scenarios (by DHI)

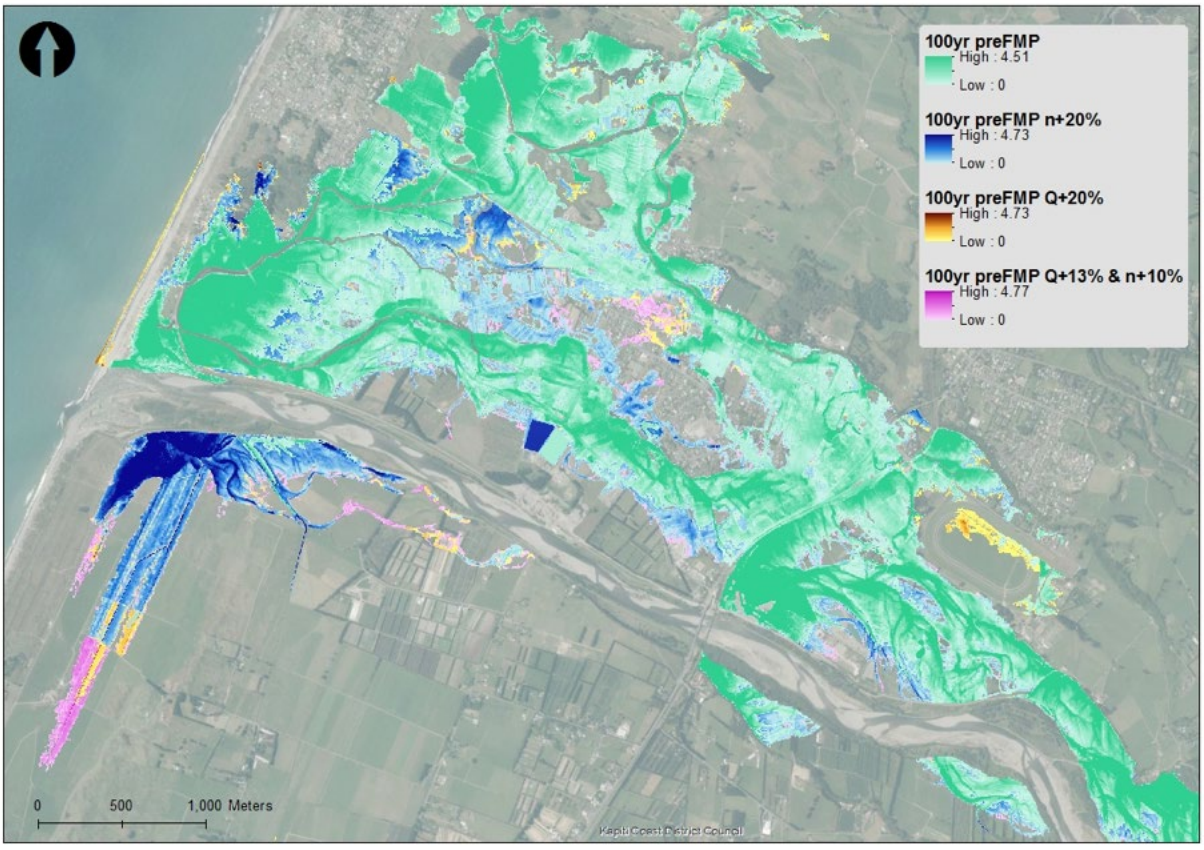


Figure 1: Model sensitivity investigations on the 100 year pre-FMP scenario

Hydraulic modelling was carried out using MIKE FLOOD, a software that integrates the 1-Dimensional (1-D) hydrodynamic representation of rivers and open channels (MIKE 11) with a 2-Dimensional (2-D) overland flow model (MIKE 21). The 2-D model used a single grid solver, for consistency with previous Ōtaki legacy models.
Two main topographical scenarios were created, before and after the 1998 Floodplain Management Plan (FMP) was implemented, the pre-FMP and FMP scenarios. The FMP structural works projected up to 2016 established the starting point for data collection, focused in the areas (from upstream to downstream) of the Lutz, Hughes and Crystalls stopbanks and the Rangiuru floodgates.

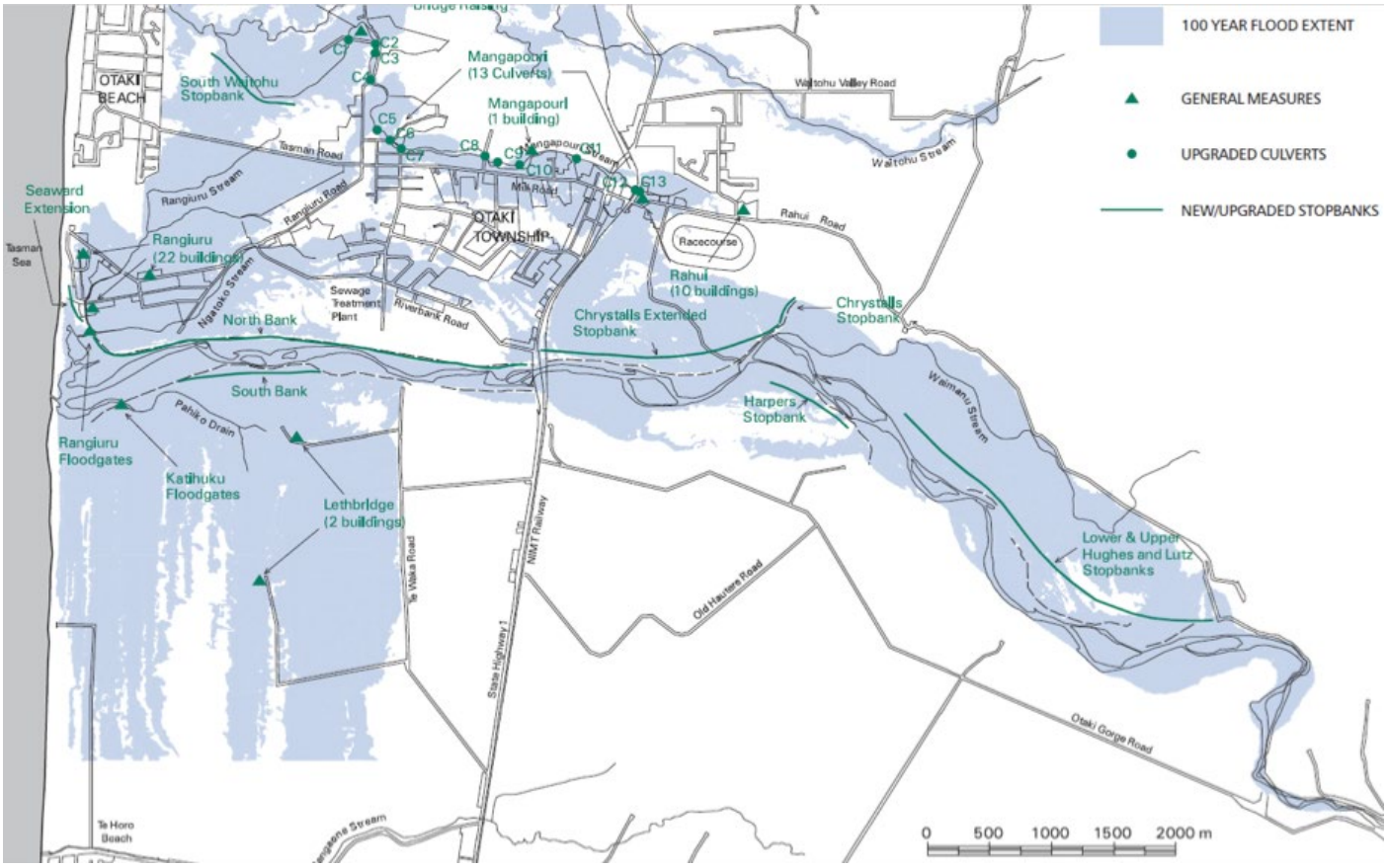


Figure 2: Otaki catchment structural methods, adapted from Otaki Floodplain Management Plan (1998)

The pre-FMP scenario used a combination of 1991 channel cross-sections, plan floodplain contours, aerial photography and 2003 LiDAR. The most challenging aspect of creating this scenario was identifying stopbank sections built prior to the FMP and recreating the river channel/floodplain interface; as an example, the river morphology adjacent to the Lutz stopbank experienced significant modifications, resulting in a wider Ōtaki section.
To obtain a comprehensive annual average damage curve, a range of design flood hydrographs were tested for model inflows, from 5year (1160 m³/s peak flow) to 1000-year (2400 m³/s peak flow) average recurrence interval. A series of sensitivity tests on the 100-year pre-FMP, identified the most hazardous flow and roughness combined scenario, i.e., an addition of the upper bound of 95% confidence limit to each of the design flows, to account for the error associated with the flow estimation, and roughness values increased by 10%. This combination of parameters was then applied to all modelled events.
Stopbank breach scenarios were also tested for three different locations, obtained from previous investigations, focusing on potential failure mechanisms; bank overtopping and scouring of the downstream face, lateral erosion by the river and seepage failure.
Across design flows, breach scenarios and sensitivity scenarios, 30 different simulations were generated, providing depth, level, velocity and hazard information to RiskScape.

Riskscape

RiskScape combines information from spatial layers representing assets' (buildings, utilities, people etc) exposure to hazard intensities (flood, tsunami, earthquake shaking) via a vulnerability model to determine damages from a given event. In this case we used:

- an asset layer of Otaki buildings, occupants, vehicles and contents;
- hazard layers representing peak flood depth derived from the DHI modelling work; and
- the vulnerability models built into RiskScape.

Riskscape was chosen as a tool because it has the most up-to-date damage functions (applicable to New Zealand) built into it and contains a lot of building asset information already. It also has the advantage of being able to estimate damage to house contents, stock, plant and vehicles. The damage functions in RiskScape currently are only based on depth, not velocity. Review of the data showed that very few buildings on the Otaki floodplain would exceed the velocity/depth thresholds where velocity damage becomes more important than inundation damage.

We did find that the Riskscape building data was incomplete. We fixed this with a combination of desk study (using GIS to pull together various Council and LINZ datasets), manual review of aerial photographs and by measuring a sample of floor heights in order to refine our assumptions.

Damage to public non-building infrastructure such as utilities and parks was not included. Likewise, flood damage repairs to GWRC Flood Protection assets were not included.

This analysis did not isolate the effects of individual works carried out under the Ōtaki FMP. In reality, it's often not appropriate to isolate the effect of individual works because they were carried out as a package and some areas receive protection from more than one element of the package.

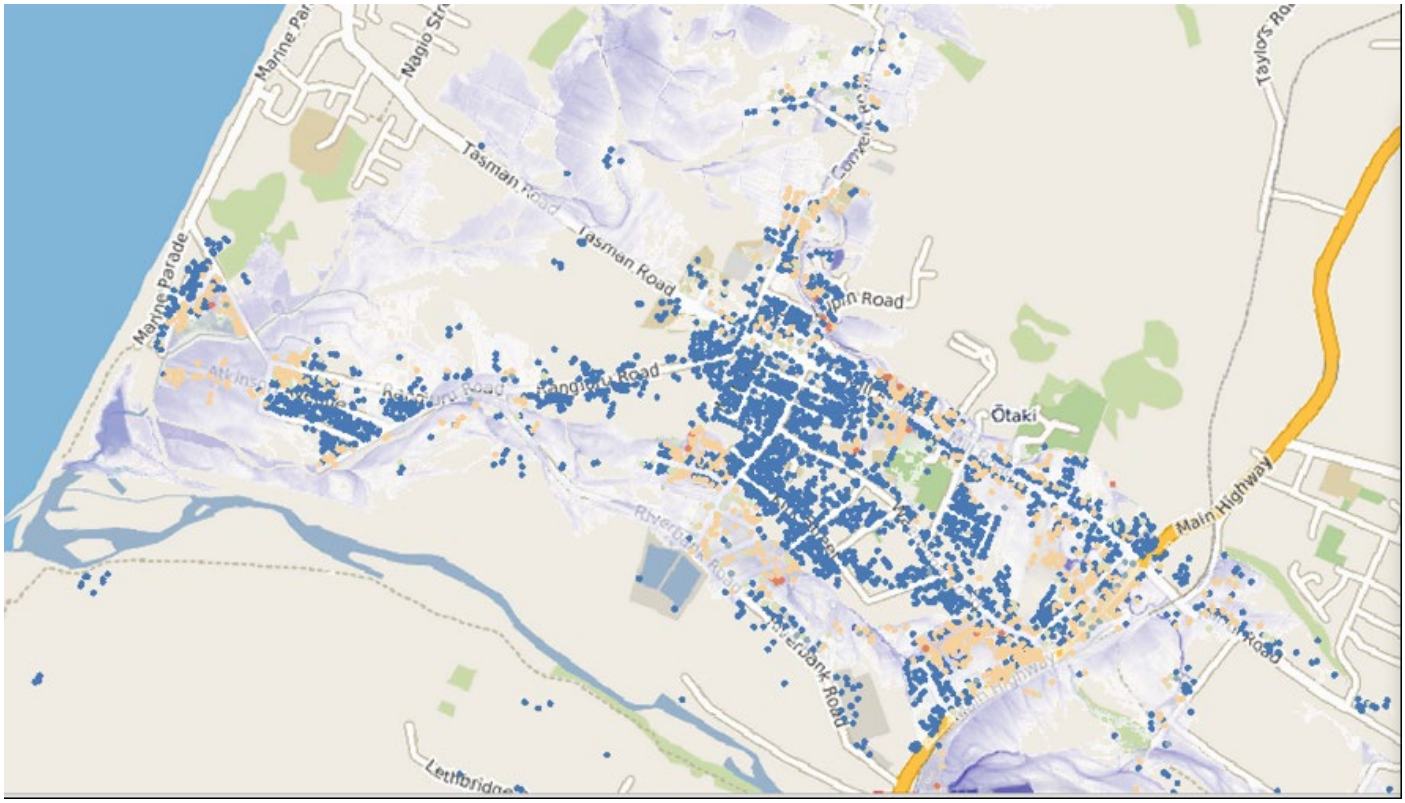


Figure 3: Example of Riskscape results - 2% AEP, pre-FMP

Results and Conclusions

The damages in a single 1% AEP (100-year) event were reduced from $203M - $315M down to $4M - $7M by the main physical works carried out under the FMP.

The Average Annual Damage across all return periods was reduced from $10M - $16M per annum down to $200k - $300k.

These are large reductions and show that the works carried out under the FMP have met their aim of reducing Otaki's vulnerability to the flood hazard. Areas of high hazard remain and these do represent a risk to life that should be a focus of future emergency management planning.

THE ARCH CAMPBELL AWARD 2018 AWARDEE

NZ Rivers Group Arch Campbell Award 2018

Citation

This year's award was presented by Mark Hooker at our annual conference . The following is the citation Mark prepared for the presenataion.

"The 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. Arch Campbell served the Soil Conservation and Rivers Control Council and the subsequent National Water and Soil Conservation Organisation, which at the time was at the forefront of technical and policy developments. A major symposium on water, which he helped to organise in 1964, led to many recommendations to government and the formation of an Engineering and Scientific Committee on Water of NZ Institution of Engineers and the Royal Society of NZ. He co-chaired this committee for many years, organising six-yearly Water Conferences.

Arch was also the chairman of the Institution of Engineers Technical Group on Water and organised lively symposia on relevant topics within the annual Institution of Engineers conferences. Many engineers and water scientists now retired or in the latter stages of their careers will remember his wise mentoring and counsel.

Since 2010 the award has been entrusted to the Rivers Group. Now moving on to this year's recipient.

I think it's traditional to keep the award secret until the last moment! I don't trust myself not to blurt out his name (it is a 'he') so I'll read from my carefully prepared notes.

This year's recipient has been at the forefront of engineering practice in the field of hydraulic and river engineering for more than 35 years. His expertise in these fields is well renowned in New Zealand. He has developed strong working relationships with a number of Regional Councils and all major hydroelectric power companies and is called on by these organisations to analyse complex technical problems related to open channel flow in rivers, canals and reservoir systems.

He began his career in 1981 with the Ministry of Works and Development (MWD) working on the physical hydraulic modelling of civil engineering structures. Here he developed a strong understanding of open channel hydraulics and flow interactions with hydraulic structures. In 1985 he transferred to the MWD Power Design Office working on the investigation and design of hydropower projects. He continued to work in the hydropower field as the MWD was commercialised into Opus International Consultants in 1999. His experience has broadened since then to include the computational hydraulic modelling of rivers and lakes, dam break and natural flood hazard studies, the flood safety of large hydropower systems, the design of flood protection schemes, sediment transport investigations and bridge pier and abutment scour investigations. He joined Damwatch Engineering in 2016 where he continues to work in these areas.

Notable projects he has worked on during his career include:

- Sediment Flushing studies for Lake Roxburgh. He worked with Jeremy Walsh (NIWA) to evaluate a range of sediment flushing options for Lake Roxburgh to reduce the flood risk to Alexandra. Subsequently he was responsible for reviews of the effectiveness of sediment flushing following implementation during January 1994, December 1995 and November 1999 flood events. Studies involved both hydrodynamic and sediment transport
- The Leith Flood Scheme where he has been the principal hydraulic engineer for the development of a flood mitigation scheme on the Water of Leith through North Dunedin involving extensive computational hydraulic modelling and four separate physical model studies of critical hydraulic features through the University of Otago Campus.
- Development of the Lake Wakatipu Discharge Rating where he was responsible for re-evaluation of discharge rating for the modified outlet from Lake Wakatipu that takes account of the gradual drowning of the outlet weir from the blocking effect of Shotover Rivers flows entering the Kawarau River immediately downstream and the resulting reverse flow phenomenon back into the lake
- The Mount Ruapehu Crater Lake Lahar Hazard where he was appointed a member of a scientific and technical advisory panel providing technical advice to the Minister of Conservation on lahar hazard issues arising from a potential future collapse of the tephra barrier
- A National Bridge Scour and Waterway Risk Screening project which involved developing a screening procedure for NZTA's nationwide stock of bridges on state highway network based on research carried out by Associate Professor Stephen Coleman and Professor Bruce Melville from the University of Auckland

He is the author or co-author of over 30 technical papers, either presented at local or international conferences, or in peer reviewed research journals. He has acted as a reviewer for the American Society of Civil Engineers Journal

of Hydraulic Engineering and the NZ Hydrological Society's Journal of Hydrology (NZ). He has also co-supervised, with the inaugural Chair of the Rivers Group, a Master of Engineering thesis involving experimental investigations of the breaching process in overtopped embankment dams and development of a mathematical model.

He has acted as an expert witness on hydraulic and river engineering at a number of Environment Court Hearings and Mediations regarding resource consent appeals for major infrastructure projects. He is a Fellow of Engineering New Zealand and a Chartered Professional Engineer (CPEng). He was also a founding committee member of the Rivers Group and served as Secretary of the group for a number of years. In preparing for this award, I had a chuckle when I saw that the certificate template seemed to have originally been created by him.

Some comments from his colleagues have included:

- He is very passionate about hydraulics, so much so that his spare time on his daily commute by train from the Hutt to the CBD is often spent reading hydraulics journal papers, books or articles and his weekends often involve his personal work with the Friends of the Waiwhetu Stream to restore the Waiwhetu Stream near his house in Lower Hutt.
- His strengths are his meticulous attention to detail and dedication to finding a solution which is both practical and 'works'. He has contributed to numerous infrastructure projects that have, and will continue to, serve generations of New Zealanders.
- He is an unrivalled mentor of graduate hydraulic engineers, willingly sharing his knowledge while introducing them to the practical realities of working on real world problems. A perfectionist himself, with exacting standards, he is a supportive, encouraging, and when necessary sympathetic and understanding, teacher. His briefings at the start of projects are legendary in their detail. As a mentor, he is often the victim of his own success. Graduates he has mentored are sought after by other consultants who recognise the exceptional training and experiences he provides. The dissemination of his acolytes has raised the standards of hydraulic engineering globally.

Finally: this year's recipient is nominated because of his "notable contribution over a number of years to the advancement of knowledge or practice in the fields of catchment hydrology, catchment management, or river engineering". In particular, he has made an outstanding contribution over his 37 year career to the advancement of knowledge and practice in the fields of hydraulic and river engineering.

It gives me great pleasure to present the 2018 Arch Campbell award to Dr Grant Webby."

The NZ Rivers Group congratulates Grant of being a thoroughly well-deserved Awardee of the Arch Campbell Award for 2018.

CONTESTABLE FUNDS PROJECTS PROGRESS REPORTS

Tim Green, Canterbury University

Are structural instream habitat additions an effective tool for restoring benthic communities in lowland Canterbury waterway

This Master's study aimed to identify to what extent the structures that provide habitat for aquatic macroinvertebrates in forested streams, such as boulders and large wood, are effective as a tool for restoring these communities in lowland Canterbury waterways, where such habitat is typically scarce.

Sampling effort was large, and consequentially, accurately processing samples was an immense (yet highly important) task. The Rivers Group Contestable Fund allowed a small team of research assistants to assist with this task, which allowed key deadlines to be met, while maintaining the quality of the research.

Research findings concluded that although the addition of structures can improve the availability of food resources, and refugia and oviposition (egg-laying) habitat for some aquatic macroinvertebrate groups in lowland Canterbury - factors which will become increasingly important as wider-scale stream rehabilitation is achieved in the region - local habitat availability was not the factor most limiting the restoration of these communities. Rather, findings indicated that the alleviation of wider-scale factors that limit insect dispersal from healthy forested streams to restoration sites, such as poor landscape connectivity associated with widespread deforestation, must be prioritised before localised in-stream habitat restoration is likely to foster positive shifts in these stream communities.

For further information see https://ir.canterbury.ac.nz/handle/10092/15577 or if you have questions email timcharlesgreen@gmail.com

CONTESTABLE FUNDS PROJECTS PROGRESS REPORTS

Andrew Neverman, Manaaki Whenua – Landcare Research

Listening to Gravel to Manage Periphyton through Improved Hydrological Limits

Bedload entrainment and transport are important processes for riverine ecology, but are often overlooked as growth limiting factors for nuisance periphyton (algae) when establishing management plans to limit periphyton accrual. Ensuring regular occurrence of bedload entrainment and transport events through hydrological limits and managed flow regimes may offer a solution to limiting the occurrence of nuisance algal blooms and excessive periphyton accrual. This requires site-specific entrainment and transport thresholds for bedload to be known to establish effective hydrological limits. This paper presents a sensor system designed to identify thresholds for bedload transport in New Zealand's dynamic gravel-bed rivers.

Gabriel Spreitzer - PhD Student, Department of Civil and Environmental Engineering, UoA

Large Woody Debris (LWD) Research in New Zealand

River systems in forested catchments are affected by organic debris material reaching the stream channel and influencing hydraulic flow conditions. Changes in hydraulic flow conditions present challenges at higher discharge rates, such as during flood events, where flow-sediment-wood interaction processes become complex, and potentially disastrous.

We observe this complex interplay globally, and are working together with our colleagues in Europe and North America; however, especially for New Zealand, with its unique landscape and natural hazards, there is a risk for our river crossing infrastructure, nearby properties and ecosystems. Landslides, caused by storm events and earthquakes, are assumed to be the main suppliers of large woody debris (LWD) from both, natural (e.g. mass wasting) but also anthropogenic (forestry) sources. Due to the impacts on property, infrastructure and environment, a better understanding of these interaction processes between LWD and flow hydraulics is required.

CONTESTABLE FUNDS SUCCESSFUL APPLICATIONS 2018

NZ Rivers Group Contestable Funds Awardees 2018

1. $2,500 to Thomas Kay for 'Droning on about rivers: a technique for using drone technology to measure river habitat quality'
2. $1,250 to Will Conley for 'Investigate nature and timing of Waingawa River braidplain abandonment upstream of Masterton'
3. $1,250 to Clare Wilkinson for 'Tracking post-earthquake sediment pulses with beryllium-10'

Descriptions are still all in the dropbox folder

PHOTO COMPETITION VOTING NOW OPEN

VOTING NOW OPEN - CLICK HERE

WHAT'S BEEN

CANTERBURY UNIVERSITY'S WATERWAYS POSTGRADUATE CONFERENCE 2018

Jo and Sjaanfrom our committee facilitataed the Lincoln and Canterbury University's Waterways Postgraduate Student Conference 2018 that was held on 20 November 2018. Jo and Sjaan presented a Rivers Book and Certificate to:

Best oral presentation - **Corinne Bataille, PhD Candidate**

Opening locked gates: Identifying land owners' attitudes to kaitiakitanga

My research investigates attitudes, enablers and barriers towards kaitiakitanga (environmental guardianship). I examined psychological factors affecting the ability of tangata whenua to practice kaitiakitanga, focusing on mahinga kai (customary harvest and management of waterfowl and wetlands). A general inductive approach was used; and Kaupapa Māori research principles (indigenous epistemology) were followed, which assume early and ongoing consultation with, and guidance from iwi (Ngāi Tahu).

Twenty-five participants from two interest groups, tangata whenua (i.e., Māori customary practitioners and harvesters) and land owners, who associate with waterfowl or wetlands, in Te Wai Pounamu (New Zealand's South Island), took part in semi-structured interviews. Findings suggest that access to or through privately owned land is a major barrier to tangata whenua practicing kaitiakitanga and customary harvest. Moreover, affect (e.g., trust, fear) plays a primary role in land owners' willingness to grant access. Other barriers include cognitive factors (e.g., knowledge) and social factors (e.g., intergroup contact). Using Contact Theory and Common In-group Identity Theory, the research suggests that (1) positive intergroup contact may reduce fear, increase trust and promote positive intergroup perceptions, and (2) both land owners and tangata whenua may achieve their own goals – around managing and harvesting waterfowl– through collaboration and the adoption of a shared affiliation (e.g., as environmental stewards). These strategies would contribute to the revitalisation of kaitiakitanga and the cultural expressions (e.g. language, kawa, tikanga)

Best poster presentation - **Christopher Meijer, Masters Candidate**

Environmental factors that affect kōwaro (Canterbury mudfish) populations

Stress-tolerant species that reside in extreme conditions outside the niche of competitors and predators are likely to be particularly vulnerable to global environmental change. Kōwaro (Canterbury mudfish, Neochanna burrowsius) are an example of such a species. They persist only in isolated waterbodies on the Canterbury Plains which allow them to avoid predators. However, these habitats are often subject to harsh environmental conditions, such as extreme habitat drying.Sites, identified as either an isolated pool or 20 m reach, were selected within the Waianiwaniwa Valley and along the Hororata River and, using stable isotope analysis with support from gut content analysis, site-specific isotope biplots were constructed. Using variation in pool depth as a proxy for drought intensity and canopy cover, we investigated the likely impact of changing drought regimes on the food webs of mudfish- inhabited waterways. Whilst there was no change in overall community stable isotope biplots, the trophic position of kōwaro was significantly influenced by both drying intensity and canopy cover. Therefore, it is important that both the aquatic and riparian environments are considered and included in future kōwaro population management.

Stress-tolerant species that reside in habitats characterised by extreme environmental conditions are likely to experience contractions of inhabitable niche space, particularly when dispersal to alternative habitats is limited. A comparison of 26 populations of stress- tolerant Kōwaro (Canterbury mudfish, Neochanna burrowsius) in the Waianiwaniwa Valley and along the Hororata River indicated that these resident populations were influenced by both riparian and instream conditions. These effects were both direct, such as the relative abundance of young-of- the-year being positively associated with plant coverage, and indirect, such as variation in water depth (a proxy for drying intensity) being dependent upon an interaction between canopy cover and dominant tree type. Therefore, it is important that both the aquatic and riparian environments are considered and included in future kōwaro population management.

Over 140 people attended the symposium from a wide range of academic departments, district and regional councils, and industry organisations, and their was a really high calibre of presentations and posters this year. Read more full abstracts here.

The importance of in-stream and riparian vegetation for kōwaro (Canterbury mudfish) persistence in a changing world

Christopher G. Meijer, Helen J. Warburton and Angus R. McIntosh
christopher.meijer@pg.canterbury.ac.nz School of Biological Sciences, University of Canterbury

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

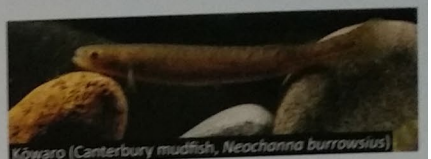
Why work with kōwaro?

Kōwaro (Canterbury mudfish, *Neochanna burrowsius*) are **critically endangered** and persist in **isolated populations** within a **heavily-modified agricultural landscape**.

They must cope with multiple threats including: **livestock access, periodic drying and exotic plants.**

Furthermore, in these harsh environments, **cannibalistic predation by the adult kōwaro may be common.**

Consequently, **kōwaro of different sizes likely have different habitat requirements**, with adults searching for food, and juveniles looking for shelter.


Kōwaro (Canterbury mudfish, *Neochanna burrowsius*)

Aim

To investigate the effects of in-stream and riparian vegetation on kōwaro populations.

Hypotheses

1. Aquatic and overhanging riparian plants enhance juvenile recruitment.
2. Trees enhance populations of reproducing kōwaro, but not if they're willows.

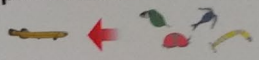
Methods

Study sites: 24 kōwaro-inhabited streams in the Selwyn River catchment, that differed in drying intensity, and in-stream and riparian plant cover.

Environmental measurements: Relative drying intensity = coefficient of variation for water depth.

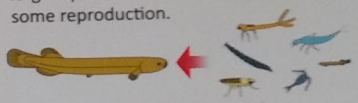
Population survey: Kōwaro were caught using unbaited Gee-minnow traps left to soak for ~24 hours.

The link between kōwaro diet and reproduction



Juveniles (0+ year old) consume only small aquatic prey and can not reproduce.

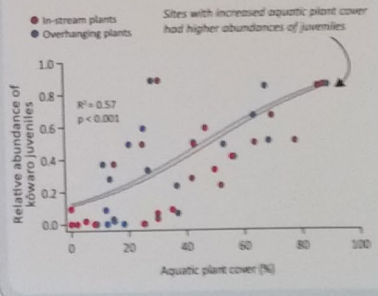
Young adults (1+ year old) consume some large aquatic invertebrates, and invest in some reproduction.



Multi-year adults (2+ years old) predominantly consume large aquatic and terrestrial prey, and invest significantly more into reproduction.

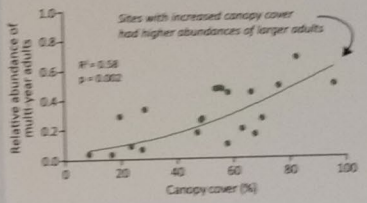
Aquatic and riparian plants: their value will grow on you

The greater the vegetation cover, the higher the abundance of juvenile kōwaro

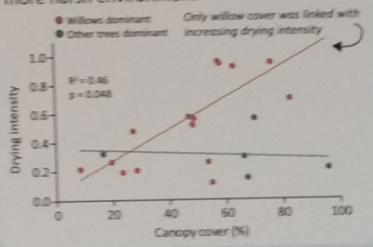


Kōwaro and willows: A love-hate relationship

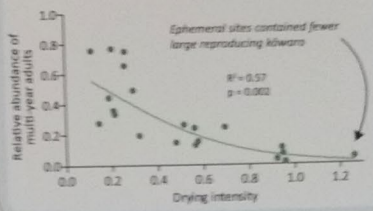
Greater canopy cover = more large kōwaro



However, greater willow cover means a more harsh environment



Furthermore, a more harsh environment means fewer large kōwaro



Take home messages

Increased aquatic plant cover likely facilitates higher juvenile survival, by providing shelter.

Terrestrial canopy cover enhances kōwaro adults, likely driven by greater prey availability.

Willows pose a significant risk to ongoing kōwaro persistence, by causing drying.

For more information:

See our presentation on "Trophic interactions of kōwaro across a gradient of drying intensity"
Read "Improving conservation of kōwaro" handout
Visit www.ferg.org.nz

Acknowledgements

We thank the staff and students of FERG, the Brian Mason Scientific and Technical Trust, and the Waterways Centre for for Freshwater Management.

BRIAN MASON SCIENTIFIC & TECHNICAL TRUST

Waterways

Poster - Christopher Meijer, Masters Candidate

WHAT'S BEEN

WELLINGTON REGIONAL RIVERS GROUP EVENT REPORT

On Tuesday 16th a diverse range of members converged for an evening of presentations, networking and pizza. There was a wide range of content in the presentations, with speakers from the Regional Council, Aurecon and Engineers Without Borders. A lot of discussion was sparked. We thank the speakers, attendees and Aurecon for hosting.

ANNUAL CONFERENCE PALMERSTON NORTH 21 - 22 NOVEMBER

What fantastic attendance at the 2018 Rivers Group conference in Palmerston North! We had 106 attendees, all from a diverse range of backgrounds and from right across New Zealand. Dan Hikuroa's presentation was topical. He addressed some critical river issues that communities, and especially māori, are dealing with, most notably how we have lost the connection with our rivers, and how we need to see and treat the 'water system' as a whole system.

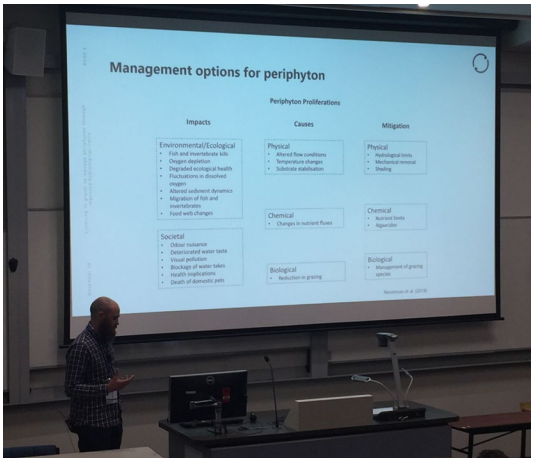
Dr John Hayes presented some very interesting concepts about how to determine minimum flows, and that to truly provide for fish habitat, minimum flows should be varied, and based on certain species to drift feed. Sjaan Bowie gave us a fantastic summary of the National Fish Passage Guidelines, and a look at what challenges are now being faced, namely screening of water takes for fish protection.

Les Basher's presentation highlighted the potential impact of climate change on hillslope sediment production in the Manawatū, and High Smith provided an insight into how SedNetNZ can be modified to assess potential meander migration rates. Simon Vale's presentation on sediment fingerprinting was hugely interesting, and has the potential to be taken up by local and territorial authorities who are seeking to understand erosion processes in their catchments.

Ian Fullers presentation on the Habitat Quality Index provided a summary of a very useful monitoring tool to assess geomorphic and ecological change. I could see this method being useful in on-going assessment of flood schemes. Ian, Jeff Watson and Jon Bell's presentations on floods past present and future, gave us an insight on how to extend our knowledge of the flood record based on floodplain sediment cores, the changes in monitoring and measuring floods over the last several decades (helicopter flood monitoring anyone?) and the implications of this information on the management of floods.

Andrew Neverman's work on 'listening to gravel move' is ground breaking. He not only custom built an impact and flow monitoring plate to detect when a gravel bed becomes mobile, but he also identified that the initiation of gravel bed movement is most likely related to the interaction of sub-surface and surface flows within the channel. What was most astonishing is bed transport is most likely initiated when the transfer of water goes from surface to sub-surface!

Otane School brought tears to the eyes of many attendees. Their passion, curiosity and commitment to their stream restoration project was an absolute inspiration to many of us working in that field, and a reminder to all of us that we should never lose sight of why we do what we do! Gabriel Spreitzer's work on the impact of large wood (woody debris) and log jams on sediment transport is hugely topical, and will undoubtedly be the backbone of how we make decisions regarding plantation forestry practices in the future. Finally, Will Conley's work looking at decadal bed profile behaviours in the Wairarapa is pertinent to any River Manager working to understand bed movement and the implications of long term trends on river management actions.



The dinner was a fantastic event, with a poignant talk from Catherine Knight on reconnecting to her 'place' and her 'river'. Her river related 'dad jokes' gave all of us some material to break out at Christmas lunch! Grant Webby's Arch Campbell award was well deserved and well received. What a fantastic contribution he has made to the river space over the years, and he has been an inspiration and industry leader. Also congratulations to Ella Whale for winning the heads/tails prize!

The following day there was a field trip . Approximately 90 participants were treated to four site visits at and around Palmerston North .

Stop 1: The new PNCC footbridge/cycleway Bridge connecting the City to Linton and Massey.

Stop 2: Paul Joseph from Horizons addressed the field trip paticpiants about horizons post 2004 Lower mamanwatu cscheem upgrade which is nearing completion as well as outliningissues and creative thinking around supporting and integrating community aspirations about the river and special interest group facilities into major river engineering works.

Stop 3: Ashurst Domain rehabilitation works at the confluence of the Pohnagina and Upper Manawatu river

Stop 4 : The participants were treated to a visit to the inner sanctums of the manawatu gorge . a real privilege for the group facilitated by NZTA to whom we are most grateful.

Stop 4 : A nutritious brown paper bag lunch overlooking the gorge

Stop 5: Again the group was treated to an outline of the concept designs and layout of the new alternative Gorge Route. The presentation was facilitated by Greg Hill from NZTA

The NZ Rivers Group conference organisers wish to thank all the contributors to the field trip which was by all acounts very much appreciated by all participants.

The Waterways Research outputs page is live!

The Waterways Centre for Freshwater Management has a new webpage which lists research outputs by WCFM members for 2016 and 2017. A glance at these documents will reveal impressive work which spans a wide range of issues. It won't be long before we start collating 2018 outputs!

NZ Rivers Group members only area on website

The Rivers Group members area is now available for you to view! There are many resources including recordings of some of our regional events. It will also host the River Managers Wiki soon! To access the members area please visit the website and register here: https://riversgroup.org.nz/register/

ENGNZ RIVERS GROUP AND RCEM INTERNATIONAL CONFERENCE 2019

Theme: Traditional knowledge and innovative science

Save the Date

11th INTECOL International Wetlands Conference

Spring (Oct-Nov) 2020, CHRISTCHURCH, NEW ZEALAND

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Traditional knowledge and innovative science in wetland research and management

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SPRING (Oct-Nov 2020)

Contact: Dr Philippe Gerbeaux (pgerbeaux@doc.govt.nz)

THEME: Traditional knowledge and innovative science in wetland research and management