manatiaki kōawa

rivers GROUP

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

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NEWSLETTER

Issue 28 | February 2020

FROM THE CHAIR

Heide Friedrich

We are bringing you a new edition of *FLOW* after a long break over summer. We finished 2019 on a high, with having hosted the successful international conference, the *River, Coastal and Estuarine Morphodynamics Symposium* – RCEM 2019 in November. We had 270 participants, from 21 countries (New Zealand, United States, Japan, Netherlands, China, France, Italy, Australia, United Kingdom, Taiwan, Spain, Switzerland, Germany, Canada, Singapore, India, Brazil, Chile, Mexico, Portugal, Poland). A big thank you for the fantastic local support, we had 69 participants from New Zealand, as well as a strong showing from the US (36), Japan (35), Netherlands (23), China (19), France (17) and Italy (15).

In our AGM, which took place during the conference, we said good bye to some Rivers Group management committee members, some of them long-serving. Sarah Basheer, Brian Kouvelis, Trevor James and Will Conley all retired from the committee after the AGM. Sarah has been instrumental in supporting the group nearly from the beginning, and will be sorely missed. Brian has been coordinating our newsletter *FLOW* for years and we have been working on adapting to a new *FLOW* production in the last months. We are wishing them all the best for the future. In the meantime, we welcomed new committee member, which we will introduce in detail in the next issue of *FLOW*.

During the 2019 AGM, we talked about our plans to use 2020 to work on a new strategic plan. The group's current strategic plan was adopted at the first AGM 27 September 2010, with it being now outdated, and goals largely achieved if not exceeded. In preparation for our full-day management committee meeting in February, we realised we should also review how we work as a committee, and how we can help our membership to best *'work together to promote good river management'*. I will share more with you about our journey on this in the next *FLOW*.

Shortly thereafter, all our life's got disrupted with the advent of COVID-19. Some of the management committee members, Jon Bell and Amanda Death, have been pulled in to help with the emergency coordination centre supporting the response to COVID-19 during that time. This is an important service to our communities, and I want to thank Jon and Amanda for their work in that area.

Looking forward, we started our *'Fortnightly Reads'* emails, and are always on the lookout for articles or notifications from the rivers community that can be shared with the Rivers Group membership. Please consider submitting an article, case study, update or notice for the next issue of *FLOW*. For our *'Fortnightly Reads'* email, you can email us news items, announcements, event details, recognitions, guidelines news – anything of interest to our community.

Please email nzriversgroup@gmail.com to submit your *FLOW* contributions or any news you want to share through our *'Fortnightly Reads'* email.

Please remember to check out and connect with us through our Website, Facebook, Twitter and LinkedIn. The current COVID-19 pandemic is providing challenges for organising our Rivers Group & Hydrological Society Joint Conference in December 2020. The conference website will be updated as new information comes to hand.

Heide Friedrich,
Chair

AGM REPORT

Heide Friedrich

Summary

2019 has been a transitioning year for the Rivers Group. Nationally, all eyes are on the Draft National Policy Statement for Freshwater Management: *Action for healthy waterways: A discussion document on national direction for our essential freshwater*, which was open to consultation September 5. In the committee we had discussions about our role in advocating and influencing policy and if/how it can be aligned with our objective of *Working together to promote good river management*. We also are a joined technical interest group of Engineering New Zealand and Water New Zealand, with both bodies already playing a prominent role in driving national initiatives, as well as our members having various roles in other organisations, who submitted to the consultation. At the end we did not invite members to help with preparing a Rivers Group submission, as we felt we are not set up presently to do so, yet we will keep monitoring through what mechanisms the Rivers Group can best represent our diverse membership.

Internally, we continue to have a very active and engaged committee. Our committee grew to 16 people in 2019, with 5 new members, and we had discussions what is a good size for the committee. We are working on collaborating with other groups and organisations to bring more events to you. Four of our committee members have been very busy in the local organising committee of the 2019 Rivers Group conference that took place in November – the 11th River, Coastal and Estuarine Morphodynamics Symposium – RCEM 2019. The Rivers Group was instrumental to attract this highly regarded international conference series to Aotearoa, New Zealand for the first time. Committee members also organised in April 2019 a very successful 2-day workshop on 'Lessons learnt from large flood events in the Bay of Plenty Region', a joint effort by the Rivers Group and River Managers Group. And together with the Engineering New Zealand Auckland Branch, we delivered a well-attended seminar on channel bank erosion and stability in the Auckland Region.

2019 saw another increase in the group's membership and we continued our communication efforts, concentrating on with Website revamp, Facebook, Twitter and LinkedIn as our main communication channels, in addition to the newsletter.

Financially, the group is in a very good position, having made a profit from the 2018 conference. The group's finances are administered by Engineering New Zealand. With changes within Engineering New Zealand, we have lost access to our reserves, which is very concerning. At the end of FY 18/19, our reserves are $55,183 excl GST. We have been in discussion with Engineering New Zealand since February 2019 to acknowledge and get access to our reserves, which has been resolved in a meeting in February 2020.

With having had our *Identity and Positioning* document developed in 2018, we plan to use 2020 to work on a new strategic plan. The group's current strategic plan was adopted at the first AGM 27 September 2010, with it being now outdated, and goals largely achieved if not exceeded.

The committee continues to struggle to meet the demand for regional events and we continue

to seek support from the membership for ideas and volunteers to coordinate these, as well as emphasising the role of events coordinator in our committee for 2020.

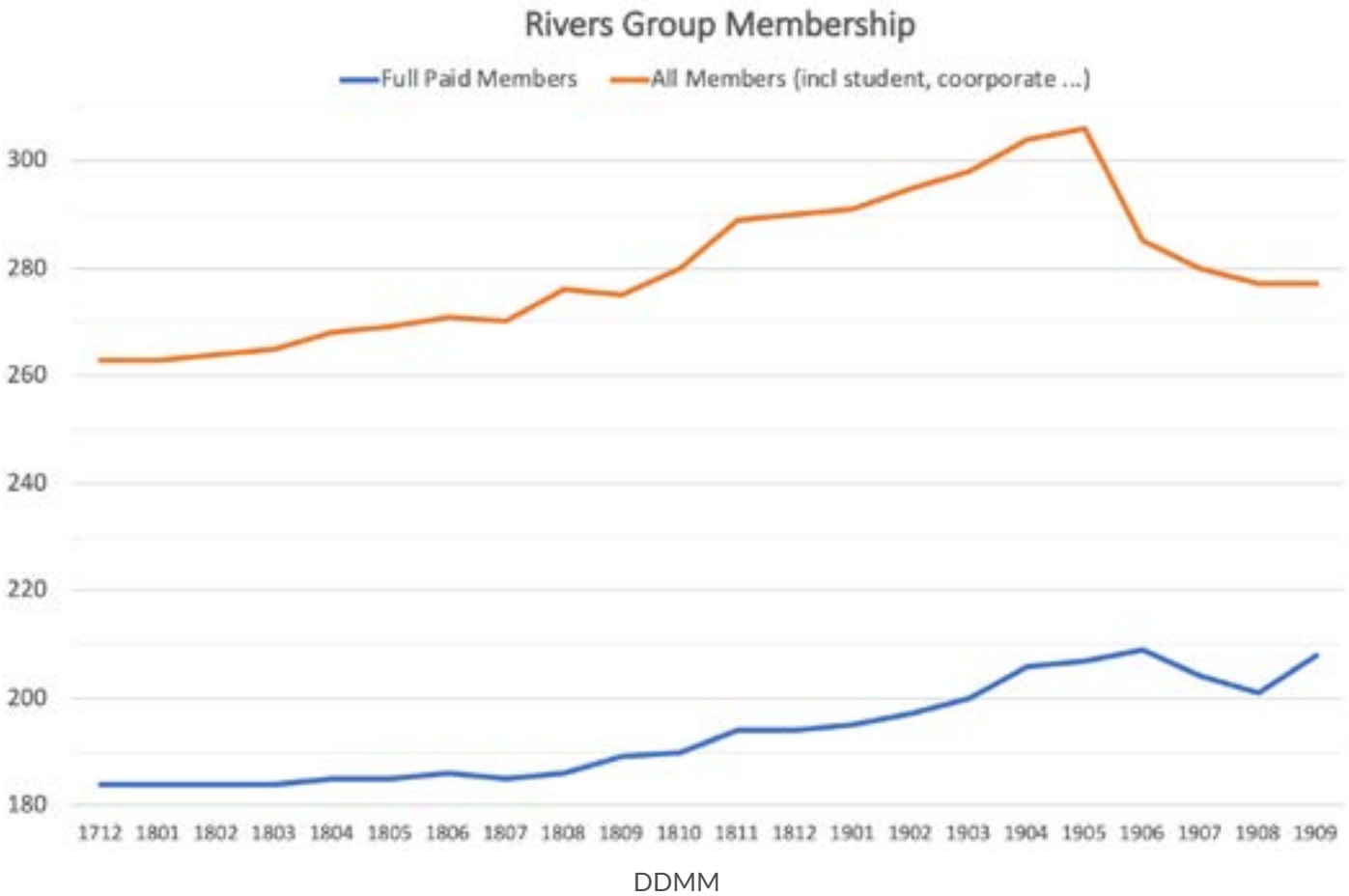
I'd like to thank again our 2018 outgoing chair Mark Hooker for having been instrumental in a smooth transition and having laid a lot of the groundwork of our 2019 success. We are looking forward to the time when Mark comes back to New Zealand and joins our committee again. I also would like to acknowledge the continued support of a passionate, experienced and capable committee.

The Group at a Glance

The Rivers Group is a community of people with a technical interest in river management, which seeks to develop and share its body of knowledge to influence and facilitate better outcomes for New Zealand's rivers.

We are a joint technical group of Engineering New Zealand and Water New Zealand.

Membership



We continue to see a growth in our membership, this year from 190 to 208 full members. Overall group membership in all classes passed 300 during the year. Out of those, we presently have 59 student members. We reviewed our student membership in the middle of the year, which resulted in asking some student members to review their membership, as we had and still have a few students who have passed student status. This resulted in the drop to below 300 for overall group membership.

Our aim continues to increase awareness for the group's existence and activates and to grow our membership base. We aim to get students interested in the group, and look after members in that early career phase.

2019 Activities

- River, Coastal and Estuarine Morphodynamics Symposium (RCEM) in Auckland
- 2-day workshop on *Lessons learnt from large flood events in the Bay of Plenty Region* in Whakatane
- Seminar on *Channel bank erosion and stability in the Auckland Region* with Engineering New Zealand Auckland Branch in Auckland
- Student events and prizes awarded at Massey and Canterbury universities
- Newsletter x 4
- Progress our communication plan with Website, Facebook, Twitter and LinkedIn refresh and updates, more regular emails to members
- Engineering New Zealand engagement - Groups Charter, Forum engagement and pairing groups with Engineering Practice Advisory Committee member
- Relationship building with River Managers group and other Engineering New Zealand branches and groups

Looking Ahead

- Working on collaborating with other groups to bring you more events, especially for our regions
- Increasing access to regional events via sharing presentations and videos to all members
- Update and re-run the popular short course on culvert design
- Speaking tour
- 2020 conference with NZHS in Invercargill December 1-4
- New member survey to provide membership input for strategic plan

Thank you to the committee for their efforts throughout the year, I'm looking forward to continue to serve the Rivers Group in 2020.

Heide Friedrich,
Chair

2020 COMMITTEE

Name	Role
Heide Friedrich	Chair
Laddie Kuta	Vice-Chair
Jacqui McCord	Secretary
Phil Wallace	Treasurer
Verity Kirstein	Membership Coordinator
Selene Conn	Communication Coordinator
Graeme Campbell	Local Government Representative
Kyle Christensen	2020 Conference Liaison
Amanda Death	Community Coordinator
Hamish Smith	Events Coordinator
Markus Pahlow	FLOW Coordinator
Jennifer Price	Central Government Representative
Richard Measures	Awards and Scholarship Coordinator
Ian Fuller	Academic Coordinator
Jon Bell	Regional Coordinator
Jo Hoyle	Committee Member

ARCH CAMPBELL AWARD 2019 RECIPIENT CITATION IAN HESLOP

Name: Ian Heslop

Organisation: Environment Canterbury

Position: Principal River Engineer, BE(Agriculture), CMEngNZ, CPEng

Category Nominated In:
A 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.

Reason For Nomination: Ian is nominated for the significant contribution he has made over his 40 year career to the advancement of best practice and knowledge in the field of river engineering and the understanding and communication of residual risk within the communities with whom he has worked.

Ian Heslop – Waimakariri River, Canterbury

Career History

Ian has contributed 40 years to River Management in New Zealand and has made a significant contribution across the country, including the initiation, investigation and implementation of flood protection schemes throughout the Gisborne, Wairarapa and Canterbury Regions. He is well respected, a leader in his field and a mentor to many. His advice and guidance continues to be sought by Regional Councils around the country including most recently:

- Greater Wellington Regional Council in respect to enhancing the level of flood protection for Greytown in the Wairarapa as it enjoys unprecedented growth which sits close to the Waiohine River
- West Coast Regional Council in respect to firstly the Waiho River bursting its banks and flowing through Franz Josef township and secondly the loss of the Waiho River Bridge on the State Highway at Franz Josef
- Buller District Council in respect to the flood threat being posed to Westport due to rapidly rising bed levels in the Buller River.

In his role as Principal River Engineer with Environment Canterbury, his most recent and significant achievements have included the development, design management and delivery of a $40 million upgrade to the Waimakariri River flood protection system to protect areas of the Waimakariri and Selwyn Districts and Christchurch City, coordinating and managing Environment Canterbury's response to both the Christchurch earthquake and Kaikoura earthquake events, and being part of Environment Canterbury's flood response team.

The following is a summary of the career of achievements for Ian Heslop in the field of River Engineering:

- 1979 to 1984 – East Cape Catchment Board: Design and construction of drainage and flood protection works, river scheme maintenance and groundwater investigations in both the Gisborne and Opotiki areas.
- 1984 to 1985 – Ministry of Works and Development: Investigation and promotion of community irrigation schemes on the Poverty Bay flats.
- 1985 to 1990 – Hawkes Bay Regional Council: Design of flood protection, drainage and coastal protection works for the Heretaunga Plains area.
- 1990 to 2002 – Wellington Regional Council (Wairarapa Division): team leadership, operation and maintenance of 10 river management and 15 drainage schemes, asset management, floodplain investigations, river scheme reviews, flood hazard assessments, investigation, design and construction of flood mitigation works.
- 2002 to 2004 – Riley Consultants Limited: review of Project Aqua resource consent application, pre-feasibility design and costing for the proposed Barrhill-Chertsey Irrigation Scheme pipelines, canals and pump stations, hydrological assessment, pre-feasibility design and costings for dam, irrigation and hydro-electric development options within the Hurunui catchment, vast range of work with Transpower hydro-electric dams: safety inspection, analysis, infrastructure maintenance of intakes, control gates, pipelines and tunnels.

- 2004 to present day – Environment Canterbury: Technical design lead and engineer to contract for upgrades to Ashburton Town Stopbanks, Washdyke Creek Stopbanks, Little River Enhancements, Ashley River Secondary Stopbank. Leader of technical advice for resource consent applications, environment court expert witness statements, scheme reviews, flood risk analysis, financial planning. Ian's most notable achievements while working with Environment Canterbury include the delivery of the Waimakariri Flood Protection Project, leading the earthquake response for the Canterbury and Kaikoura earthquake events and his contribution to the flood response teams following flood events.

Ian's significant achievements and contribution can be summarised as follows:

Advancement of Knowledge and Best Practice

Ian was one of a new breed of river engineers who moved away from "gut feel" as the basis for their decision-making and adopted a scientific, evidence-based approach to investigation, design and decision-making processes.

His work with the East Cape Catchment Board evidenced this approach, through adoption of the first hydraulic modelling undertaken by an organisation outside of the then Ministry of Works and the work he led on the first major upgrade of the Waipaoa River flood protection system since construction in 1947. This work was instrumental in the protection of Gisborne City from major inundation during Cyclone Bola.

Ian also embraced the value that Soil Conservators brought to the table and this became a cornerstone for a collaborative, inclusive approach to flood protection which utilised all the tools in the toolbox.

> *"Ian installed in me the importance of science and technical evidence to support decision making and justify recommendations"*
> ***Graeme Campbell – Manager – Flood Protection, Wellington Regional Council***

Communication

One of Ian's greatest attributes is his ability to communicate complex flood protection and river engineering issues in a simple, easily understood and digestible manner to the general public, politicians, technical experts and fellow professionals in a manner that engenders trust and respect, even when the message is unpalatable or opposed. He achieves this through being an excellent listener and the use of facts supported by evidence. This has enhanced the reputation and confidence in the role of the River Engineer in the areas that Ian has touched throughout his career.

For the Waimakariri Flood Protection Project, Ian led the consultation and communication processes which involved the general public, developers with significant vested interest, affected landowners on the floodplain, consent authorities and politicians.

> *"It is a testament to the integrity and principled approach that Ian brought to the communication and consultation process that during the construction process as we engaged with landowners the response was invariably one of – "yes, we remembered that you talked to us about this and indicated that's what you would do. We appreciate that - just get on and do what you have to do."*
> ***David Bridges, Principal, Good Earth Matters Consulting***

Leadership

Ian's leadership style is that of a quiet achiever who leads through evidence and facts underpinned by excellent communication and collaborative skills. Notable career achievements which reflect this include:

Early 1980's	Waipaoa River Flood Protection Upgrade Responsible for the investigation, design and construction of the first upgrade since the scheme was built in 1947. This work saved Gisborne City from major inundation during Cyclone Bola.
Late 1980's	Heretaunga Plains Flood Protection Scheme This scheme, which was first constructed some 135 years ago, has presented unique and ongoing challenges for river engineers as land use practices and community expectations have changed. Ian's role in the late 1980 included the design and construction of flood protection, drainage and coastal protection works.
1990's	Ian fulfilled the role of Divisional Engineer - Wairarapa Division with the then Wellington Regional Council managing 10 staff with an annual budget of $2.4 million. Notable achievements included: • Operation and maintenance of 10 river management schemes and 15 drainage schemes within the Wairarapa area. The major scheme was the Lower Wairarapa Valley Development Scheme, one of the largest flood protection and drainage schemes in New Zealand, with a current asset value of $67 million. • Lower Taueru River Management Scheme This project was particularly difficult as it started from a position of conflict between landowners and Council. The Taueru River had become choked with willows over many years, aggravating local flooding. A group of landowners undertook aerial herbicide spraying of the river channel to try and ease the flooding problem. This spraying was carried out illegally, and created a threat of tree debris movement and downstream channel blockage. The Engineering Section successfully set up a rating district and completed a tree clearance scheme, and in the process built up a high degree of goodwill and co-operation between the ratepayers and Council. This is a testament to Ian's communication skills, technical expertise and integrity. • Waiohine River and Floodplain Investigation This successful project consisted of the investigation of the Waiohine River and floodplain, including the review of existing river management scheme performance, identification of flood hazard zones, design of future river management and flood protection options, implementation of a preferred river management option, development and implementation of a new funding basis and rating classification, and consultation with affected groups.

- Greytown Stopbank Construction
  Following on from the Waiohine River and Floodplain Investigation, this project consisted of the construction of 1.5 kilometres of stopbank to protect Greytown. Responsibility was held for all stages of the project, including the obtaining of resource consents, preparation of construction drawings and contract documents, landowner access agreements and compensation, and tendering.

Early 2000's	Whilst working as a consultant for Riley Consultants, Ian's expertise and knowledge was sought by Regional Councils with projects including: • Acting as an ECan reviewer for the Project Aqua resource consent application, in particular the construction and stormwater related issues. • Advising on the approach adopted for the Gisborne District Council's Waipaoa River Flood Control Scheme rating classification review.
Late 2000's to Date	Whilst working for Environment Canterbury Ian's expertise has lifted the game in terms of how river engineering is thought of and executed. Notable achievements include • **Waimakariri Flood Protection Project** The Waimakariri River presents a significant flood risk to Cantabrians residing in parts of Waimakariri, Selwyn and Christchurch City. Following the completion of the primary flood protection works in the early 1980's, a review identified potential future risks. Following the flood events in the Manawatu in 2004 and Bay of Plenty in 2005, the then Chief Executive, Dr Bryan Jenkins, who was also a professional engineer became increasingly concerned about the flood risk posed by the river on Cantabrians. Ian was summoned to Dr Jenkins office and asked to develop a plan to improve the resilience of the systems building upon the investigation work that had been undertaken by the Regional Council over a number of years. Ian's task was to make it happen and deliver the project. The project protects from the potential of more than $8 billion worth of damage, through the improvements to the primary stopbanks, and the development of a comprehensive secondary stopbanking system, giving Cantabrians peace of mind. The project required resource consents from Environment Canterbury, Christchurch City Council, Selwyn District Council and Waimakariri District Council. The consents were granted in 2009. Consenting was achieved without any appeals to the Environment Court. This is an outstanding achievement which is testament to Ian's leadership, the principled approach be brought to communication and consultation and the technical leadership he provided as a river engineer. In 2010, the project received an Association of Consulting Engineers New Zealand Gold Award of Excellence for the consenting of the project Construction began in the spring of 2010 and had a 10-year window for completion. The key goals were:

- To ensure that both the northern (Waimakariri District) and southern (Christchurch City and Selwyn District) sides of the river had a reduced flood risk
- Upgrading the existing primary stopbanking system
- Construction of rock bank erosion protection works
- Retro-fitting a secondary stopbanking system

The rock armour protection work along the banks of the Waimakariri River required more than 260,000 tonnes of rock. The project has seen the upgrade of 35km of primary stopbank, and the construction of a 25 km secondary stopbank. The project will be completed in late 2019, ahead of schedule and under budget.

For more detail, see:
This great video youtube.com/watch?v=5_xgMYyTPEU
This great web story spark.adobe.com/page/mSygmSVuFThHK/

- **Earthquake Response**

  Canterbury Earthquakes

  The 2010 and 2011 Canterbury Earthquakes caused extensive damage to the Waimakariri River and some of its tributaries. Stopbanks cracked, slumped and rotated. Many other river assets such as culverts were damaged beyond repair. Ian was one of the first River Engineers on the ground surveying the damage, organising urgent repairs to maintain a minimum level of flood protection to Christchurch City. Ian then developed a methodology for working on a longer term recovery plan.

  His advice and expert input was also sought by CERA in respect to the strategies for protecting areas from inundation due to slumping of the stopbanking systems on the Avon and Heathcote Rivers, and the impacts of King tides.

  Ian's strength was his ability to look at the damage, understand the physical mechanisms that had led to the damage and enunciate a practical evidence-based approach to repair work.

Earthquake Damaged Stopbank – Waimakariri River

Kaikoura Earthquakes
Ian was instrumental again in leading the response during the 2016 North Canterbury earthquake, particularly for Kaikoura. Ian was one of the first River Engineers on the ground to assess damage and immediate flood risk. As road access was cut off, Ian made many flights in to support works staff and contractors. The Kowhai River suffered extensive damage to its stopbank network and Lyell Creek next to the main town had significant bank slumping. Ian's experience, calm professional manner and sound technical advice were invaluable in enabling Environment Canterbury, Kaikoura District Council, Civil Defence Groups and wider agencies to make informed decisions in order to recover and ensure ongoing community resilience.

A number of small isolated settlements beside streams were at significant risk due to changes in ground level and material deposition close to the coast and Ian's expertise and willingness to embrace nature rather than impose hard engineering outcomes meant that timely, reassuring responses could be put in place whilst the longer term big picture was sorted out.

- **Flood Response**
  Ian has provided invaluable contribution to the Canterbury and West Coast Flood Control and Flood Response teams during his 15 years at Environment Canterbury. This contribution has been both at the management level and at a response level.

  Ian has led the development of the Waimakariri River Flood Warning and Emergency Evacuation Plan which provides systems and processes for evacuating residents on the floodplain in the event of the large flood in the Waimakariri River.

  Recently, Ian was part of the rapid response team, twice sent to assist the West Coast Regional Council. The first was when the Waiho River flowed through the Scenic Circle Hotel, the second was when the Waiho River Bridge was undermined.

Nomination Supported By

Mike Meehan, Chief Executive, West Coast Regional Council

Leigh Griffiths, Manager River Engineering, Environment Canterbury

Graeme Campbell, Manager, Flood Protection, Wellington Regional Council & Rivers SIG Chair

David Bridges, Principal, Good Earth Matters Consulting

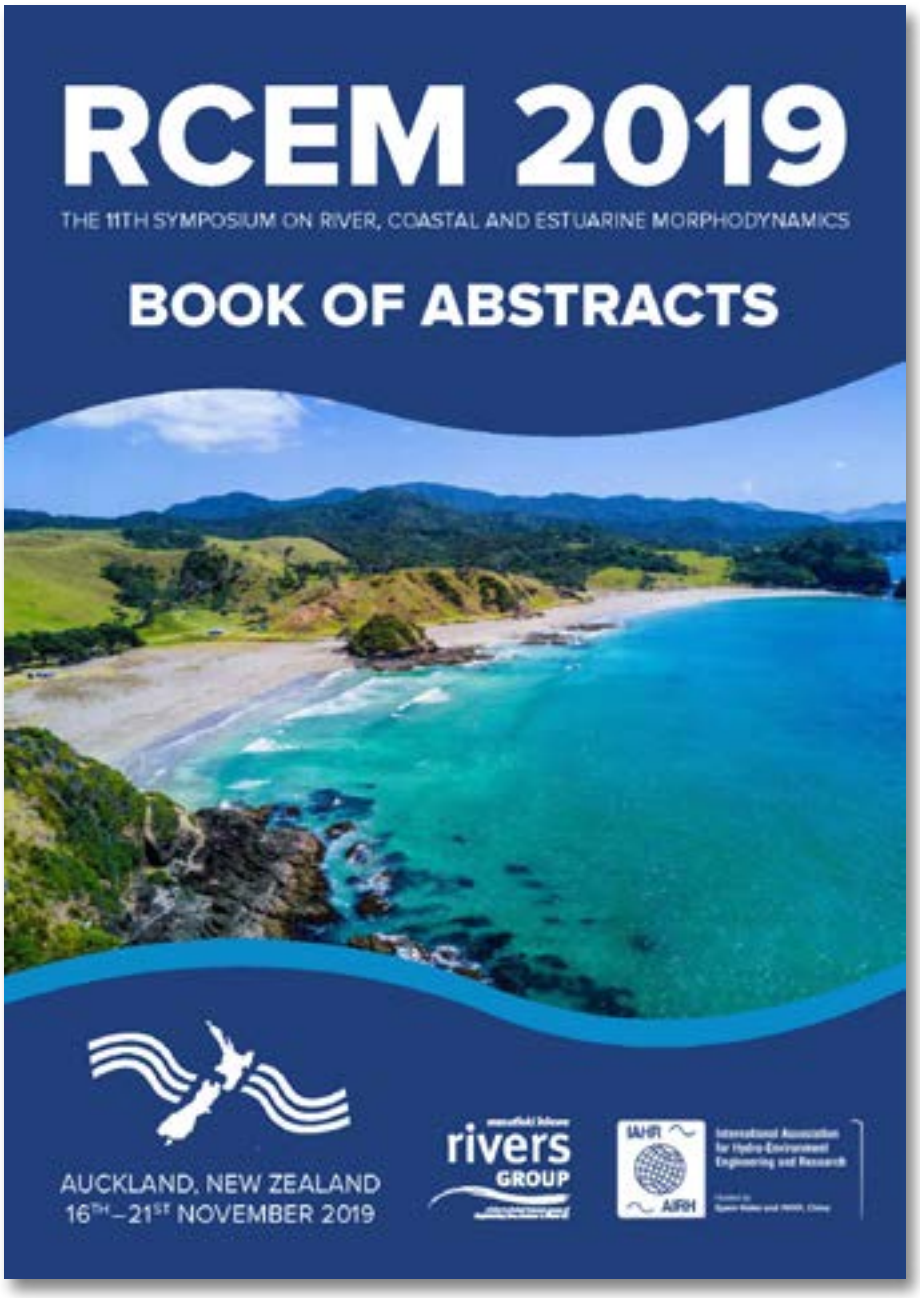
Shaun McCracken, Regional Lead – River Engineering, Environment Canterbury. CPEng

Bill Bayfield, Environment Canterbury, CEO

ARTICLES

Abstracts from from RCEM 2019

An abstract from the RCEM 2019 Conference has been included in this issue of the newsletter. The link to all the abstracts presented at the conference can be found at rcem2019.co.nz/programme



MORPHOLOGICAL MODELLING OF THE WAIKATO RIVER BETWEEN HAMILTON AND PORT WAIKATO TO ASSESS THE LONG TERM EFFECTS OF SAND EXTRACTION

H.L. MacMurray[1], V.J. Henderson[1]

[1]Barnett & MacMurray Ltd, Hamilton, New Zealand

1. Introduction

The Waikato River is one of the largest in New Zealand, with a catchment area of 13701km2 at Mercer (near the limit of tidal influence), 8230km2 at Hamilton, and 3487km2 at the outlet of Lake Taupo. Upstream of Hamilton, seven hydro power dams were built on the river. The furthest downstream of the dams (Karapiro) located about 30km upstream of Hamilton, was completed in 1947. Construction of the dams cut off the sediment flow from a large part of the catchment, and created a long term degrading trend in the river downstream. The lower Waikato River has a sand bed and a low gradient, of approximately 1 in 10,000 between Hamilton and the coast. Sand mining has been carried on in the Waikato River at various places over most of the 20th century, accentuating the tendency for the river bed to degrade. The Waipa River is a major tributary and source of sediment to the lower Waikato River, with a catchment area of approximately 3,000km2 at the confluence with the Waikato River at Ngaruawahia. Average monthly flows in the Waikato just downstream of the Waipa confluence vary between about 250m3/s in late autumn to about 450m3/s in mid winter. The lower river remains an important source of sand for the construction industry. The purpose of the investigation reported here was to assess the long term effects of continued sand extraction on river bed levels.

2. Sand extraction proposal

Winstone Aggregates applied for resource consent to extract 200,000m3 (bulk volume) of sand per year from a site near Tuakau, in the lower tidally influenced reach of the river. This reach of the river tends to aggrade if there is no sand extraction.

3. Morphological model

A one dimensional morphological model was constructed using DHI MIKE 11 software, extending from Hamilton to the coast on the Waikato River, and from Whatawhata to Ngaruawahia on the Waipa River. The model was based on surveyed river cross sections with an average spacing of 600m, and was calibrated to reproduce observed changes in river bed volume between 1998 and 2007. It was verified by simulating river bed changes over the period from 1988 to 1998. The calibrated model was used to predict changes in river bed volume up to 2057. The hydraulic and morphological time steps were 5 minutes and 60 minutes respectively, thus satisfactorily resolving the tidal flow and level variation in the lower river.

4. Sediment inflow boundary conditions

The sediment supply from the Waikato River to the lower river at Ngaruawahia mainly comes from erosion of the river bed. A sediment inflow function was derived for Hamilton such that the

observed river bed degradation was reproduced over the calibration period. For the prediction simulation, the sensitivity to a declining rate of river bed erosion was tested.

The sediment supply from the Waipa River to the lower Waikato was estimated to be approximately 60,000m3/y by measuring sediment transport during a high flow event. The model satisfactorily reproduced the sediment flow rate by specifying a fixed bed level boundary condition.

5. Discharge and tidal boundary conditions
A tidal boundary condition reproducing the neap - spring cycle and with a gradually rising mean level of the sea (by 0.32m in 2050) was generated. Discharge time series were generated by processing the data from the river flow gauges at Hamilton, Ngaruawahia, and Rangiriri, and allowing for an increase in flood flows of approximately 20% by 2050.

6. Prediction simulations
The model predicted that the river bed between Ngaruawahia and the coastal delta would erode by about 2 million m3 without the proposed sand extraction, and by about 8.6 million m3 with the proposed extraction. The corresponding average lowering of the river bed in the extraction reach near Tuakau was approximately 0.95m, with the proposed extraction, and approximately 0.7m without any further sand extraction. The model also predicted that in the absence of sand extraction, two reaches in the lower river, upstream and downstream of the extraction site, would aggrade up to 2057, by approximately 0.5m, reducing the flood flow capacity.

7. Monitoring
A resource consent for sand extraction was granted. A condition of the consent is that river bed levels near the extraction site are monitored at 4 yearly intervals. To date the changes in river bed level have been somewhat smaller than the morphological model predicted.

8. Conclusions
The Waikato River has a long term tendency to degrade downstream of the hydro dams. That trend is exacerbated by the historical and continuing sand extraction. However the predicted differences in future bed levels due to the sand extraction are relatively modest.

References

Barnett & MacMurray Ltd 2010: Assessment of effects of Waikato River sand extraction. Report for Winstone Aggregates.

KAITUNA RIVER RE-DIVERSION OPENING CELEBRATED

Katrina Knill, Bay of Plenty Regional Council

Looking downstream towards new channel (right) created as part of the Kaituna River re-diversion project

The Maketu community came together with Bay of Plenty Regional Council last month, to celebrate the return of freshwater flows from the Kaituna River into Te Awa o Ngātoroirangi / Maketu Estuary. The $16.6m Regional Council funded project has been more than a decade in the making.

“It’s been an incredibly challenging but also rewarding project,” said Bay of Plenty Regional Council Coastal Catchments Manager Pim De Monchy.

In 1956, the Kaituna River’s flow was diverted away from Maketu Estuary and out to sea via Te Tumu Cut, to support drainage of the low-lying farmland in the area and protect it from flooding. As a result the estuary silted up, become choked with algae, and birds and fish had lost their breeding and feeding grounds. In response, local people have been asking central and local governments since the 1970s for freshwater flows from Kaituna River to be returned to the estuary.

Bay of Plenty Regional Council began work to answer that call in 2008, starting with options assessments, feasibility studies and consultation work began in 2008, with more than 18 different river re-diversion options considered. A preferred option was chosen in 2013 and several years of further consultation, fund sourcing, land acquisition, consent and Environment Court processes followed, before construction work began in July 2018.

A team of consultants assisted at various stages of the project including DHI, WSP, Beca, Waterline, and Eco Nomos Ltd. J Swap Contractors Ltd were contracted to complete the construction works, which began in July 2018 and were completed in February 2020; on budget and five months ahead of schedule.

“It’s a great example of what can be achieved when everyone works together. We’ve had a fabulous team of consultants, contractors and a tangata whenua collaboration group helping and guiding us

along the way. Co-operation from local fishers, landowners, and the Western Bay of Plenty District Council have also helped us to complete the project on budget and ahead of schedule," Mr De Monchy said.

Up to twenty percent (600,000m3 per tidal cycle) of the Kaituna River's fresh water can now flow into the estuary, and 20 hectares of wetlands have been re-created. This means that the health and mauri of the estuary, along with the people and wildlife it supports, can now recover while existing levels of flood protection and boating access via Te Tumu/Kaituna cut are maintained.

Works have included the widening of Ford's Cut Channel, relocation and upgrade of stop banks, re-contouring to create wetlands, and installation of a new 60metre wide channel (one kilometre long) to carry freshwater from the Kaituna River into the Maketu Estuary via 12 large culverts, fitted with automatic gates, under the Ford Road bridge.

A new salinity block was installed downstream of the new channel, to reduce saltwater intrusion into the upper estuary, and the Ford Road boat ramp facilities were upgraded and transferred into private ownership. Volunteers have helped to plant the new wetland called Te Pā Ika with 65,000 native plants.

Kaituna River re-diversion - project overview map

Kaituna River re-diversion area post-construction – foreground shows upgraded boat ramp (left), new culverts under the bridge (right) and the newly restored Te Pā Ika wetland beyond the bridge (to right)

Mr De Monchy said that since 1956 it has taken 15 tidal cycles to flush the estuary with river water, but it will now take only two and a half tidal cycles when all twelve of the new culverts are open.

“For the first year of operation we’ll be allowing the estuary to adapt gradually by opening just nine culverts on each tide, and monitoring that closely before we open all twelve,” he said.

See further project details and background information at boprc.govt.nz/kaitunarediversion

Left: 12 February opening celebration – Aunty Ruby Tapsell and Gabrielle Kerr cut the ribbon to open the new Kaituna River re-diversion control gates, while Bay of Plenty Regional Council Kaituna Catchments Manager Pim De Monchy looks on.

Right: 12 February opening celebration – Te Arawa waka paddlers prepare for the opening of the Kaituna River re-diversion control gates behind them.

MORE FISH, FLAX AND FLOCKS FOR TE POUREPO O KAITUNA

Katrina Knill, Bay of Plenty Regional Council

Following a site blessing on 15 January, the first stage of earthworks to restore 70 hectares of wetland beside the Kaituna River is nearly complete.

Bay of Plenty Regional Council is leading and funding the $3.8m Te Pourepo o Kaituna wetland creation project which is due for completion by June 2023. The project will contribute to an overall 200 hectare wetland restoration goal set by tangata whenua and the community for the Kaituna catchment area.

The project has been made possible through a land purchasing partnership by two local iwi groups. Tapuika and Ngati Whakaue banded together to buy 28 hectares of crown-owned land beside the Kaituna River last year. That land has now been leased to Bay of Plenty Regional Council for wetland restoration purposes.

The Māori-owned land is adjacent to the Lower Kaituna Wildlife Management Reserve which contains a small remnant of the once vast wetland taonga (treasure) that used to cover the lower Kaituna plains. The area was prized for the tūna (eels), flax and kahikitea forests that lived there, but those values were lost when most of the plains were drained and coverted to grazing pasture in the 1950s-70s.

The reserve is administed by Department of Conservation in partnership with Fish and Game New Zealand. It contains 42 hectares of grazing land which will also be retired and restored as part of the Te Pourepo project.

The project will be delivered in four stages over four years. Along with stopbank changes and new fish friendly water intake control gates; planting, weed control and minor earthworks will be completed to rehydrate the 70 hectares of former floodplain and almost double the size of the existing wetland remnant.

Stage one earthworks have focused on a 21 hectare section of the Māori-owned block. New open-water areas and channels have been created to improve water reticulation and fish habitat, and new inlets have been installed to

increase water in-flows from the Kaituna River. The inlets will be opened during March spring tides, and remaining 'dry' areas of the stage one section will be planted with wetland species including raupo, kahikatea, harakeke, and mānuka this autumn.

Find out more and follow project progress at boprc.govt.nz/kaitunawetland.

Project area before wetland restoration

Project area after wetland restoration

SUMMER RESEARCH EXPERIENCE WORKING ON BRAIDED RIVER EXPERIMENTS

Lucy Douglas, University of Auckland

I was lucky enough to be given a Summer Research Scholarship by the University of Auckland. This meant that I've spent 10 weeks over the summer working with Edwin Baynes and Heide Friedrich on their research project. The project is looking at how braided rivers are likely to respond to climate change. As the climate changes, it is thought that storm and heavy rain events become more common, causing a higher frequency of slips. This will result in a higher sediment load in rivers. For this reason, we have focused on changing sediment conditions to analyse how a small-scale model river adjusts.

I was excited to be told about this opportunity, as I have always found rivers fascinating. My parent's house looks into a valley where two small rivers join. These rivers flood a few times a year. It is easy to sit and watch as they come over the tops of their banks to spread across the flats in a matter of hours. Depending on where the rain falls heaviest, the rivers flood in different ways. I've always enjoyed walking along the rivers after a flood, to see where the bank has been eroded and debris left behind. Knowing that it is the flooding that makes the bordering paddocks so fertile, makes it even more special. This has given me an appreciation

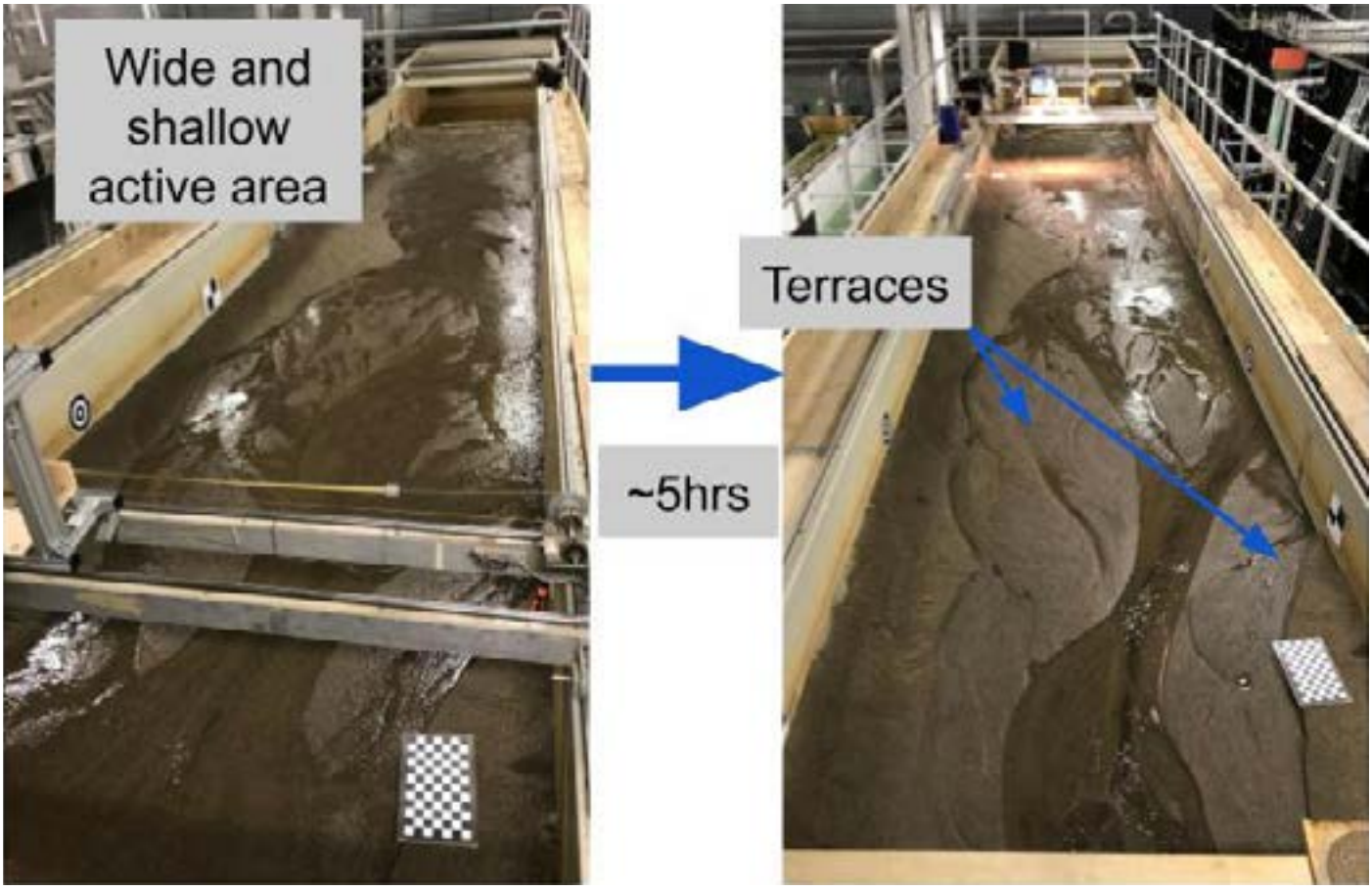


Figure 1: Evolution of the channel over 5 hours following the reduction of sediment input from 2500g to 500g every 10 minutes

that all rivers have their own personality, yet they also follow common sets of rules. Edwin's research is trying to help us understand these sets of rules more thoroughly.

By helping to run a flume-based model of a braided river, I have been able to watch these rules in action on a small scale. While the tasks of running the model may not be the most exciting, the opportunity it provided to watch the changes was. At times, the channels would change rapidly to adjust to the different sediment load they were carrying. Then the pace would slow into a methodical reworking of bars and banks, as the river reached a point close to its equilibrium state. Figure 1 shows the change that occurred during one of the rapid adjustments. It was interesting to watch these responses and compare them to what I've seen in natural rivers.

For this project, data were recorded by taking photos of the flume to create 3D models of the pattern the braided river had formed. A 3D model has been generated for every 2.5 hours of run time, allowing us to have a picture of how the river changed over time. Figure 2 shows two erosion maps generated from the 3D models, at different stages of the river's evolution. Watching the data take shape into trends as I processed it was very satisfying. It quantified what I had observed while running the model.

The 10 weeks over summer whilst working on the project have given me an insight into the world of research. I've gone from reading papers to lab work to data processing and creating a summary poster of the project. I've enjoyed my summer working with Edwin and the wider team and have learnt lots along the way. While I'm still not sure if I'm sold on research, I know I'm sold on rivers.

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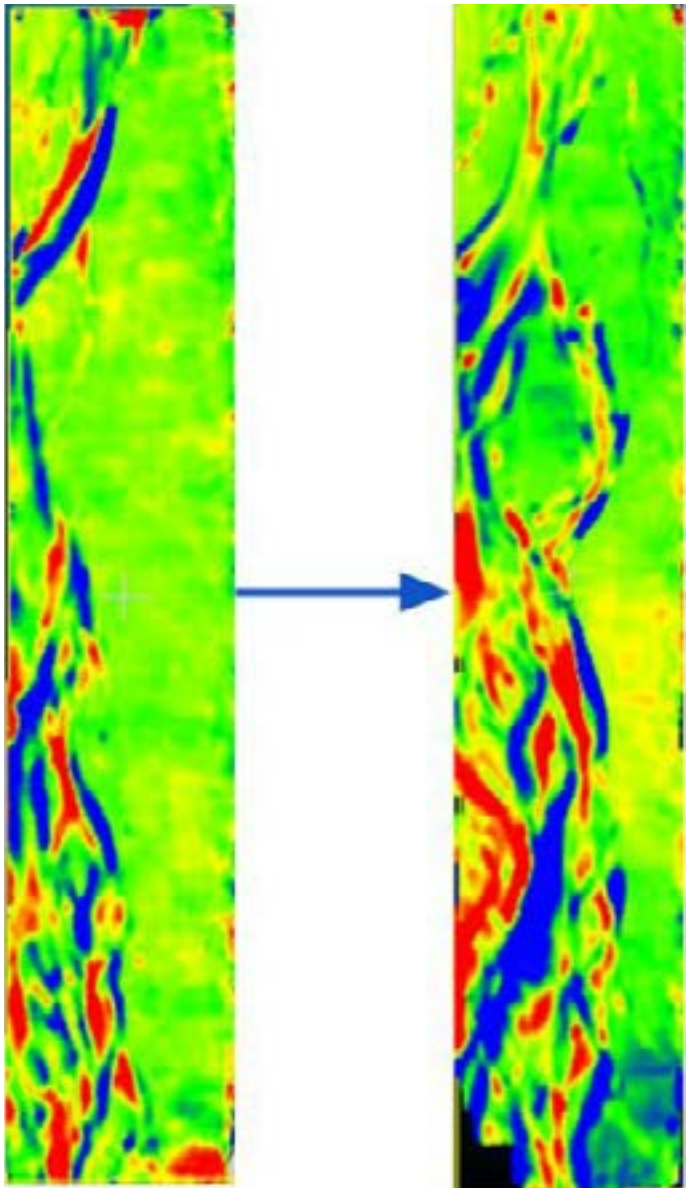
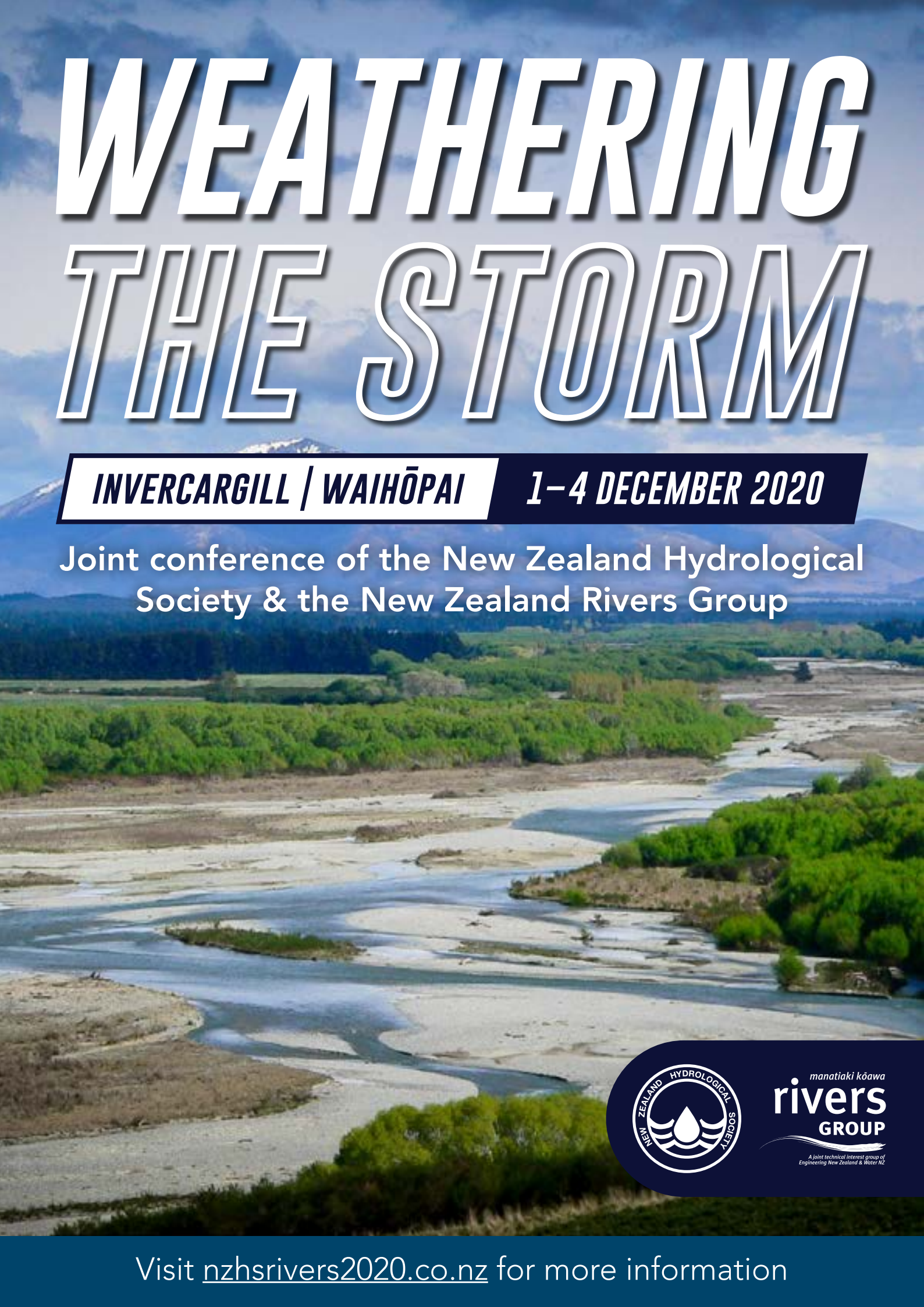


Figure 2: M3C2 erosion maps. The first is from close to equilibrium state with 500g sediment load. The second is close to equilibrium with 2500g sediment load.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A joint technical interest group of Engineering New Zealand & Water NZ
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Postponed to 24 October 2020

FUTURE EVENTS: WORLD FISH MIGRATION DAY

World Fish Migration Day (WFMD) is coming up on 16 May 2020, and we need your help!

This will be the 4th World Fish Migration Day and we would like to ask you to start thinking about what you can do to celebrate our amazing freshwater fish and the need for passage in our waterways. Please consider organising a World Fish Migration Day event and/or circulate this to the key groups you represent and encourage them to register and organise an event.

WFMD is a worldwide celebration, from local to global, which happens every two years and is supported by The Nature Conservancy, WWF and many others. We would love as many groups, organisations and people to create an event to celebrate in the month of May, especially on or around the 16th May. Last year, WFMD2018, had 570 events worldwide (5 in NZ) celebrating WFMD. If you watch this 2min short video you will learn how WFMD can be used in your region, and check out this video of an example of an event we previously ran in Christchurch.

The New Zealand Fish Passage Advisory Group (NZFPAG) is going to be leading the way developing events where our key members are located (e.g. Christchurch, Wellington, Hamilton, Dunedin, Nelson). We would love as many events as possible. The NZFPAG are also hoping to establish a national campaign to encourage people to assess their local in-stream structures using the Fish Passage Assessment Tool (FPAT) in the month of May – so watch this space for more details.

Events can be tiny or big, you decide, the important thing is not the size, but that you participate and connect with people, share your enthusiasm and knowledge about rivers and fish! Examples include outreach events, opportunities to see our fish, river walks, school activities, structure removals and remediation, training opportunities, river clean-up, fish-art competitions, public or group talks/workshops or you could show the Love Flows documentary Our NZFPAG webpage has links to activities sheets and the WFMD website is updated with new promotional materials (e.g. Love Flows poster and flyer, WFMD banner, poster and brochure etc) that can be used.

Please, follow WFMD on Facebook (@WorldFishMigrationDay) and Twitter (@fishmigration) for updates about event opportunities and ideas, the number of registrations and, of course, all things migratory fish. Be sure to use the hashtags when sharing, you can use the links: **#Loveflows, #worldfishmigrationday** and **#happyfish.** We hope to also create a NZFPAG Facebook page to help promotion soon.

So don't delay register an event now – worldfishmigrationday.com/join-wfmd

With your help we can increase the awareness of fish and rivers.

On behalf of, NZFPAG, WFMD team and partners.

Hei konā mai,
NZFPAG

The 14th Hydraulics in Water Engineering Conference (HIWE 2020) still planned to go ahead 16–19 November 2020 in Auckland.

The organisers of the 14th Hydraulics in Water Engineering Conference (HIWE 2020) in Auckland are excited and optimistic that Trans-Tasman travel developments and restrictions on social gathering easing, will allow to hold HIWE 2020 in November, as planned. They have decided to keep the abstract submission system open for the time being, and encourage you to keep submitting your abstracts. Changes to registration and submission deadlines will be communicated as they become available.

Applied Hydraulics

- Best engineering practice
- Risk management
- Climate change adaptation
- Education
- Cultural practices

Infrastructure

- Three Waters
- Bridges and road design
- Pipes, pumps and turbines
- Irrigation
- Stormwater

Environmental

- Ecohydraulics
- Environmental fluid mechanics
- Ocean outfalls
- Stratification
- Water quality
- Fish passages

Coastal Hydraulics

- Ports and harbours
- Shoreline protection
- Geomorphology

Riverine Hydraulics

- Rivers
- Estuaries
- Sediment transport
- Wetlands

Hydraulic Structures

- Conveyance structures
- Dam operations
- Hydropower
- Flow structure interactions

Applied Hydraulics

- Computational Fluid Dynamics
- Smoothed-particle hydrodynamics
- Flood forecasting
- 2d modelling

Hydraulic Methods

- Technology
- Innovations
- Physical modelling
- Data collection
- Industrial processes
- Virtual hydraulics

HIWE2020.CO.NZ

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.

Deadline for article submission is **30th June 2020**, and please format your contribution as following:

- 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.

For our 'Fortnightly Reads' email, you can email us News items, announcements, event details, recognitions, guidelines news – anything of interest for our community.

Please email nzriversgroup@gmail.com to submit your FLOW contributions or any news you want to share through our 'Fortnightly Reads' email. 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 250 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 riversgroup.org.nz/joining-the-rivers-group/.