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manatiaki kōawa
rivers
GROUP

A joint technical interest group of IPENZ & Water NZ

INSIDE THIS ISSUE

NEWSLETTER

FROM THE CHAIR

Kyle Christensen

WELCOME to Issue 14 of the Rivers Groups Newsletter, "Flow", our first for 2016.

Since our last newsletter the Rivers Group Committee has had its first meeting for the year which was our annual full day, face to face session to map out our strategic priorities for the year. In reviewing our priorities for the year we look to our key objectives (soon to be updated on our webpage) which talk about sharing knowledge and best practice as well as facilitating cross-disciplinary discussion across the river management community. Overall we thought the key aspect we needed to focus on this year is growing the cross-disciplinary interactions that we provide and facilitate. With this focus we have set out a calendar of 12 regional events across NZ for the year where we will have a mixture of invited speakers from different disciplines as well as spread our advertising more broadly to attract a different mix of attendees from outside our current membership. With this is mind if you have a particular topic or a speaker from another discipline who would be interested in presenting then please get in touch with one your committee members. To get the ball rolling on this front I would like to share an invite from our friends at the NZ RMA Law Association to attend an afterwork lecture than I'm sure will be of interest to a number of members. The lecture is titled "Mitigate or Adapt? Navigating the Evolving Natural Hazards Regulatory Landscape" and is being rolled out across the country with details at http://www.rmla.org.nz/events.

Another key part of the annual face to face meeting is the election of officers and specific roles from within the committee. The following officers were elected – Kyle Christensen - Chair, Sjaan Bowie – Vice Chair, Mark Pennington – Immediate Past Chair, Sarah Basheer – Secretary, Laddie Kuta – Treasurer, Brian Kouvelis – Newsletter Editor, Alistair Allan - Website & Regional Events Co-ordinator, Jon Tunnicliffe – Academic & Research Co-ordinator, Mark Hooker – Membership Services, Jo Hoyle – 2016 Symposium Representative, Graeme Campbell – External Relationship Manager. The creation of new roles with specific responsibilities particularly around membership services and external relationships highlights our renewed focus in these areas and all members should look forward to an interesting and exciting mix of activities for the coming year.

One of the real highlights for the coming year is going to be our joint symposium with the NZ Hydrological Society and the Water Division of Engineers Australia. If you haven't done so already then please check out the conference webpage http://www.nzhs2016.co.nz/ and start thinking about what interesting projects you have been working on to present as a paper. This is going to be a great conference with an estimated 500 attendees and it presents a fantastic opportunity to connect with colleagues from the Hydrological Society as well as learn more about water resources work being done in Australia.

I trust that you will find the content of this newsletter interesting and I look forward to seeing you at one of our upcoming events.

Kyle Christensen

Chairman

CONTESTABLE FUNDS PROJECT UPDATES 2015

Rose Hay
Mangaotai Stream Rehabilitation

Argyll East School gratefully received a $1000 grant from the Rivers Group last year.

The Mangaotai creek borders the school and its farm on 2 sides. It is spring fed from the surrounding limestone farm country. It flows into the Mangaonuku River. The creek area has and will continue to provide fantastic learning opportunities for students.The school plans to develop the riparian margin closest to the school.

Willows had been removed but there was a large amount of blackberry and periwinkle on the Hall and Playgroup side. We needed to get rid of plant pests first before planting out. Because the weeds were so close to the waterway and the banks sides so steep, we used the grant to employ a professional company. The Conservation Company came in and did the first spray in November. This cost $455.40. The company plans to do a second spray in March. There will be some hand pulling of weeds after this but that area and the school side will be ready for planting in June.

A students committee was set up last year. They worked with parents and experts to create a plan for the riparian area. The students consulted with the rest of the school, Board of Trustees and community. At present they are putting down limestone paths and continue to build up plant stock in their shade house. It is an exciting project and we would like to thankyou for helping to make it possible for us.

CONTESTABLE FUNDS PROJECT UPDATES 2015

Shane Orchard
Shifts in Distribution of Whitebait Spawning Grounds post Canterbury 2011 Earthquake

The IPENZ Rivers Group Student Research Grant has assisted Shane Orchard's PhD study of shoreline management and climate change. The grant has been used to produce a report for waterways managers detailing the spatial effects of the Canterbury earthquakes on inanga spawning site locations in Ōtautahi Christchurch. This component of Shane's study sought to quantify ecological shifts in the shoreline environment associated with earthquake-related ground level changes in the vicinity of the Avon-Heathcote Estuary/ Ihutai. The wider study is using the earthquake effects as a unique ground-truthing opportunity for assessing vulnerability to sea level rise. In the upper estuarine environment shifts in the location of inanga spawning sites were hypothesised in consideration of post-quake waterline levels and salinity. The study has proven successful in detecting these and has identified a number of important changes. The new post-quake pattern is crucial for understanding vulnerability and has immediate implications for riparian management.
Some of the highlights include the discovery of highly productive spawning sites in the Heathcote/Ōpāwaho catchment distributed over a 2.5km reach of the main river. New sites were also found in the Avon/Ōtākaro catchment, both upstream and downstream of all previously recorded locations. A concentrated area of spawning was identified in Lake Kate Sheppard at a distinct location versus pre-quake records, and spawning was also recorded for the first time in Anzac Creek, a nearby waterway connected to Lake Kate Sheppard via a series of culverts. Management implications associated with this new distribution are considerable in relation to the design of approaches to protect spawning sites, with a particular focus being the effective control of threats.

Look out for a future update on this project and a link to download the final report.

CONTESTABLE FUNDS PROJECT UPDATES 2015

Andy Neverman
Development of an Impact Sensor for Peripyhton Flushing Assessment
Massey University

To assist with my PhD work the IPENZ Rivers Group awarded me a Student Research Grant of $3000 to help cover the costs of developing an impact sensor for my research on bedload transport.
The aim of my project is to develop a toolkit to study entrainment thresholds in natural channels, with the goal of using the results to set environmental flow targets to induce substrate movement to scour periphyton.
This work required the development of an impact sensor which records impacts from moving clasts as they hit the steel plate. The impact plate also has an on-board velocity sensor to look at the relationship between velocity and transport initiation. The funding provided by the IPENZ Rivers Group has been used to upgrade the velocity sensor as the previous version never worked. I am pleased to report that the upgraded version worked the second it was powered on and hasn't stopped!

Since the installation of the new velocity sensor just before Christmas day we have not had a significant transport event to truly test the sensor, but data captured to date is showing promising results. We are now waiting for the Pohangina River to flood!
The remaining funds are being used to build a second sensor which I am to install in the Rio Cordon Stream, Italy this coming May as part of a collaborative project with the University of Padova. This work aims to calibrate the impact sensor against bedload trap and PIT data from the Rio Cordon.
I would like to thank the Rivers Group for establishing the Student Research Grant and making it possible for me to carry out this exciting research.

MASSEY UNIVERSITY RIVERS RESEARCH PROJECTS PROGRESS REPORTS

Ian Fuller
Whanganui River Flood Studies

The storm of 19-20 June 2015 triggered the largest recorded flood in the Whanganui River and resulted in widespread flooding in the nearby Waitotara, Whangaehu and Turakina Rivers. In addition, landslides in the soft-rock hill country of these catchments triggered by this storm closed several roads, including the Whanganui River Road to Pipiriki.

This project will undertake a geomorphic and sedimentological assessment of channel, floodplain and slope response to this event. Using aerial imagery, the extent of overbank flood deposition will be mapped, and slope-channel connectivity quantified. Field mapping and sampling of flood deposits will assess the thickness and character of flood drapes, which will be analysed using grain size analysis and XRF. These approaches will provide an assessment of sediment sources and sinks in these catchments during the June 2015 event.

In addition, changes to the Whanganui River channel will be assessed in conjunction with Horizons Regional Council using cross-section data surveyed after the June 2015 flood. The project will also attempt to extend the flood series using the fluvial sedimentary archive of palaeochannels in the Whanganui.

Erica Malloy will be working on this project supervised by Ian Fuller, Sam McColl and Mark Macklin.

Professors evaluate floods from past

Eng Sch Wed 24/2/16

NICHOLAS MCBRIDE

"It was an unusual combination of circumstances."

Mark Macklin, Massey University professor

The Whanganui floods were an unusual event, but not unprecedented, according to Massey scientists.

Massey University professor Mark Macklin, along with associate professor Ian Fuller, spoke at the Whanganui Science Forum on Tuesday night.

According to Niwa one month's worth of rain fell across the Whanganui region in 24 hours on June 20 and the Whanganui River hit its highest level ever, 9.1 metres at the Town Bridge.

At the forum the pair discussed the science behind the June 2015 flooding.

Using a report from GNS, they could tell that the June flood reached 4775 cubic metres per second. However, the pair found that floods in March 1990, February 1940, August 1939, May 1904, February 1891, September 1858, 1864, and 1875 were all larger than 4000 cumecs.

Fuller said the June floods were an unusual event in that most of the rain was on the coast, which affected the Whanganui River's tributaries.

"That was significant in conditioning the nature of the damage particularly in Whanganui city."

The main river itself was in flood and that was exacerbated by the flooding of the tributaries.

Macklin said it was the worst of both worlds, with flooding coming through the Whanganui River itself and then through the tributaries.

"The floodwaters from those tributaries couldn't really get out to the main channel because the main channel was full. It was an unusual combination of circumstances."

Fuller called it a two-pronged attack, making for quite an unusual flood event. "Normally the rain would be heavier inland and on hill country and not as much on the coast. But here you got heavy rain inland and heavy rain on the coast."

The pair were also looking to extend flood records. For Whanganui, these only went back to 1957.

"The problem with that, is that is a relatively short record in terms of understanding the frequency and magnitude of these events."

Instrumental records suggested the June event was a somewhat unique occurrence.

However, documentary and geological records painted a fuller picture. Incorporating these into the equation suggested that floods of that level were not unprecedented.

It highlighted several historical floods, which were of similar volume as the June event. Their data also suggested a degree of frequency.

The data used flood heights put through hydrological modelling to calibrate the volume of water in the channel.

Macklin said one of the main causes of flood damage was floodplain encroachment.

"So if folks build on flood prone area then they will get flooded. Certainly some of the places we saw were new builds."

Fuller said the purpose of their talk was to highlight the issue of flooding to the community and help them understand the context for these sort of flood events and prepare for the future.

"If we can better understand recent and past floods, we can better understand and put into effect, practice and management to enhance the resilience of the community for future flood events."

MASSEY UNIVERSITY RIVERS RESEARCH PROJECTS PROGRESS REPORTS

Simon Vale
Suspended Sediment Source Quantification Manawatu River

Suspended sediment forms a fundamental component of the fluvial transport system, representing both erosion of the surrounding landscape, where it has implications for agricultural productivity, and geomorphological and environmental changes in the river channel itself, altering aquatic ecosystems through changing turbidity level and degrading water quality. It is for this reason that it is important to understand the origin, transport and redistribution of sediment within river catchments in order to fully appreciate these issues and inform appropriate management practices.

Sediment fingerprinting is one tool able to provide understanding and quantification of sediment sources, relying on geochemical differentiation and sediment un-mixing models to derive source estimates. The general approach selects a suite of geochemical elements using stepwise discriminant function analysis which provide the highest discriminatory power. These selected variables are then incorporate into a statistical mixing model to attain estimates of relative sediment source contributions to suspended sediment samples taken downstream.

This research used a mixture of XRF and LA-ICP-MS to obtain geochemical concentrations and subsequent analysis revealed CaO, Lu, Cs, Sr, Tm, Na2O, P2O5, Fe2O3, Pb, U, Hf, MnO, Zn, MgO, Nb, and Y as the best suite of variables to quantify 8 geomorphological sediment sources within the Manawatu Catchment (Fig 1). Relative source estimates of fine sediment (< 63 µm) attributed mudstone derived sediment (≈ 38 – 46 %) as the dominant source to the Manawatu River.

Sediment contributions were also estimated from the Mountain Range, ≈ 15 – 18 %; Hill Surface, ≈ 12 – 16 %; Hill subsurface, ≈ 9 -11 %; Loess, ≈ 9 -15 %; Gravel Terrace, ≈ 0-4 %; Channel Bank, ≈ 0 - 5 %; and Limestone, ≈ 0 % (Fig 2). These results have implications for perceptions of fine sediment sources within the catchment and the dominant fine sediment sources delivered to the active channel.

Although discrimination between the sources was achieved, significant challenges for further suspended sediment fingerprinting research and the certainty accompanying source estimates became apparent. The issues relate to key assumptions within the technique such as; that the sediment sources can be differentiated by some combination of geochemical indicators; that geochemical character is retained throughout transportation; and that statistical mixing models can provide accurate estimates. The extent to which natural variability within specific geochemical tracers and variation across sediment source groups themselves, along with unaccounted geochemical behaviour during transport are all important concerns for the technique which need further attention.

Further information can be found in the following article published in Science of the Total Environment: Vale, S. S., Fuller, I. C., Procter, J. N., Basher, L. R., & Smith, I. E. (2015). Characterization and quantification of suspended sediment

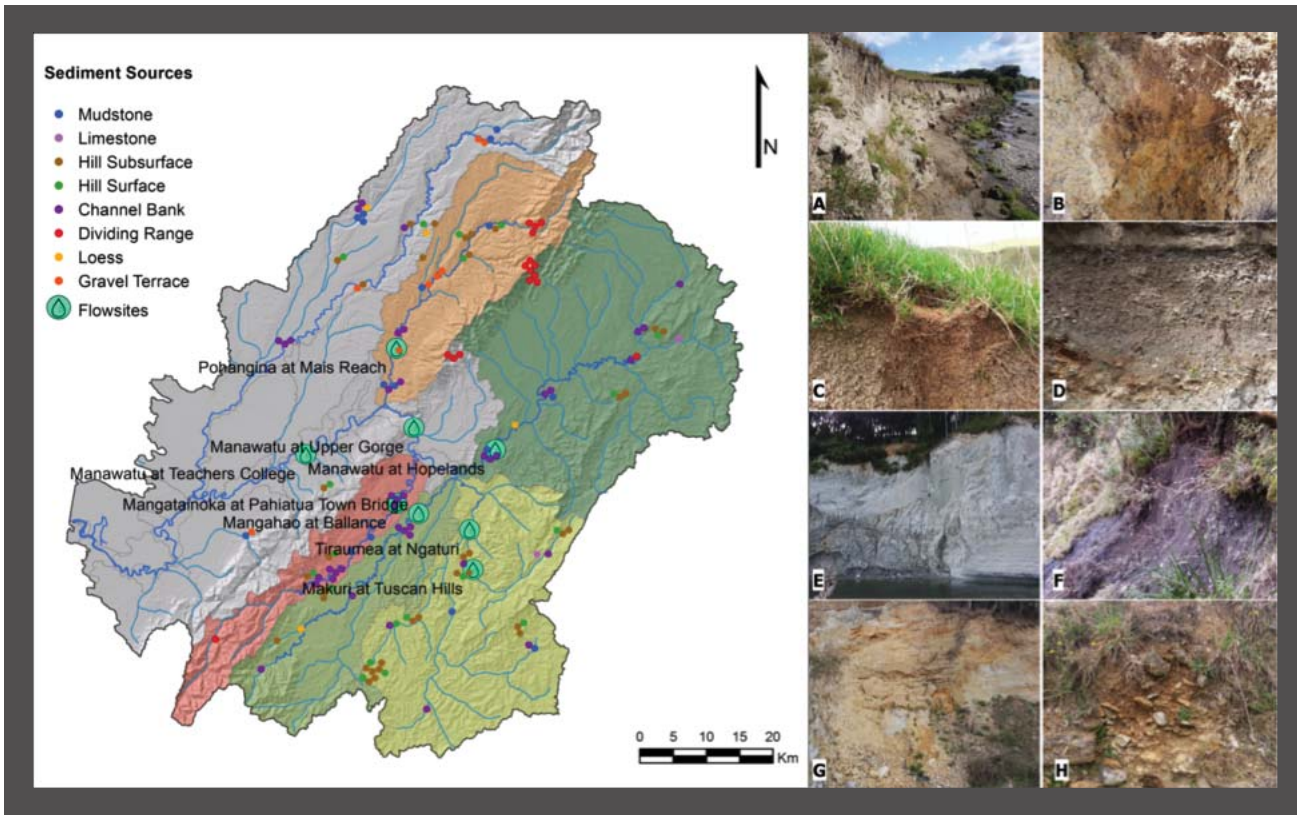

Fig. 1. Left: Manawatu River Catchment showing source sampling spatial distribution. Right: Sediment source characteristics adapted from Vale, Fuller, Procter, Basher, and Smith (2015)

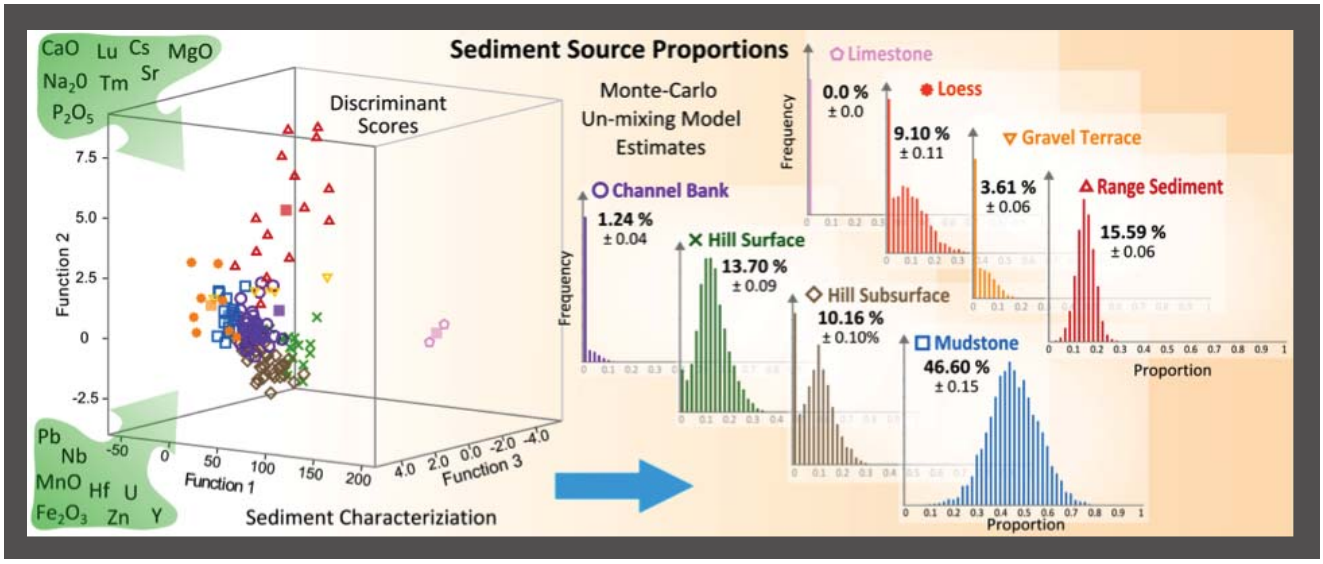

Fig 2. Reproduced from Vale et al. (2015)

REGIONAL EVENTS

THE SUSTAINABLE DELTA GAME DEVELOPED BY DELTARES AND PARTNERS

Facilitated by: Judy Lawrence (Victoria University Wellington) and Willem van Deursen (Carthago Consulting, Rotterdam)
Event Date: 14th March 2016
Time: 5:30pm – 9:30pm
Venue: Greater Wellington Regional Council, Shed 39, 2 Fryatt Quay, Wellington
Catering: Pizza and refreshments
Registration: Limited to 24. RSVP to Alistair Allan - alistair.allan@gw.govt.nz before 4 March 2016
Cost: Donation on the day

A serious game about water management, now tailored for the NZ river and floodplain environment. What is your sustainable water management plan? How will you tackle population growth, sea level rise, climate change, political direction, world events? Play this game and explore adaptation pathways for the future. You as part of a group of participants has to develop a sustainable water management plan for a river delta. You must negotiate and advocate for your decisions. Your decisions then unfold in a simulated future. Watch what happens when a flood or a drought event hits, the communities react, the political direction changes, or the economic climate alters. Bearing this in mind do you need to adapt your policy choices?

More info:
https://www.deltares.nl/en/software/sustainable-delta-game/
http://www.ipenz.org.nz/riversgroup/flow/FLOW%20-%20Issue%2013%20-%202015%20December.pdf

JOINT MANAWATU IPENZ BRANCH AND IPENZ RIVERS GROUP MEETING

Date: Monday 14th March
Time : 5.30 pm drinks and nibbles courtesy Rivers Group , 6pm meeting start. Finish up by 7pm
Place : Te Manawa
Speaker: Professor Mark Macklin
Topic: "Rivers of the Anthropocene"

Speaker Details:

Mark Macklin is Professor of Physical Geography and Director of the Centre for Catchment and Coastal Research at the Department of Geography and Earth Sciences, Aberystwyth University (UK) and Professor of Fluvial Geomorphology, Massey University.
Mark's research focuses on river system response to climate change, human-river environment interactions, palaeoflood studies, alluvial archaeology, flood-risk assessment, and metal mining impacts on river catchments. It is conducted worldwide with ongoing projects in Australia, Greece, Kazakhstan, New Zealand, Russia, Sudan and UK. In New Zealand he is currently developing new approaches to flood series extension using fluvial sedimentary archives in Hutt, Manawatu and Whanganui catchments."

WORKSHOPS

CULVERT DESIGN WORKSHOP

A interactive workshop with presentations and practical lab demonstrations; with practitioners invited to share their experiences and views. The workshop is aimed at design professionals with some knowledge and experience in culvert hydraulics, and will not only focus on culvert hydraulics but cover wider application and considerations (e.g. fish passage)

Date:	Tuesday 22nd March
Time:	9.30am - 5.00pm
Venue:	College of Engineering, Auckland University, Laboratories Newmarket
Registration Cost:	$375.00 inc GST (lunch included)

Topics:
- Design Parameters, hydraulics and methods
- Culvert types and performance
- Inlet & outlet design
- Ecological Considerations
- Asset management
- Climate change considerations
- Practical demonstrations at the new Auckland University's Newmarket Laboratories

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Presenters:
- Gary Williams (Waterscape)
- Brian Kouvelis (Sustainable Futures NZ Ltd)
- Paul Franklin (NIWA)
- Sjaan Bowie (DOC)

For further information and pre-registration contact Brian Kouvelis at: brian.kouvelis@xtra.co.nz

Breaking news – registration date extended to 5pm Friday 11th March

Follow the link below to register- Spaces limited to 40 participants on first come basis
https://oncue.eventsair.com/culvert-design-workshop-march-2016/registration/Site/Register

Rivers group reserves the right to cancel the workshop if there is insufficient registrations.

WORKSHOPS

RIVER MANAGERS WORKSHOP

Gary Williams is organising a workshop for River Managers and those associated with River Management to be held in May .

Date: TBC
Location: Wellington

The proposed format for the workshop is a panel presentation from up to 6 experienced river management practitioners with the intention that they share their experiences good and bad and what has worked and what hasn't worked in river management works designs and implementation.

The workshop will provide a forum for discussion around the development of "best practice" for river management programmes under different river regimes. A workshop not to be missed for all those involved in design , implementation and maintenance of river schemes throughout New Zealand.

Watch this space for further details

CALL FOR ABSTRACTS

Submit online at nzhs2016.co.nz **DEADLINE TO SUBMIT ABSTRACTS: 24 April 2016**

CALL FOR ABSTRACTS IS NOW OPEN

Abstract submissions for oral and poster presentations are being received for this year's joint conference of the NZ Hydrological Society, Australian Hydrology and Water Resources Symposium and IPENZ Rivers Group

THEMES

The main conference theme is "Water, Infrastructure & the Environment", authors are invited to submit oral and poster abstracts under the following topics:

- Water Infrastructure
- Climate
- Urban Hydrology
- Floods
- Water Resources
- Water Quality / Environmental
- Data
- Education

Conference Organising Committee

Charles Pearson (NZ Chair) // NIWA
Mark Babister (Australia Chair) // WMAwater
Sarah Mager // Otago University
Lawrence Kees // Environment Southland
Tim Davie // ECan
Jo Hoyle // NIWA
James Ball // University of Technology Sydney
Monique Retallick // WMAwater

Scientific Committee

Tim Davie // ECan
James Ball // University of Technology Sydney
Katherine Daniell – ANU
Brendan Berghout
Janice Green – BoM

Important Dates

Abstract Submission Deadline (Short abstract 250 words) 24 April 2016
Authors notification of acceptance 13th May 2016
Final papers must be received by 26th June 2016
OR Extended Abstracts (2 pages) by 28 August 2016

ENGINEERS AUSTRALIA

NEW ZEALAND HYDROLOGICAL SOCIETY

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For further Information Contact Phone: +64 3 546 6330
On-Cue Conferences Email: tracy@on-cue.co.nz