Issue 13 : December 2015 - ISSN 1179-674X

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 13 of the Rivers Groups Newsletter "Flow", our second for 2015 largely thanks to the efforts of our newsletter editor Brian Kouvelis and the team at OnCUE. There has been a lot of action to report on since our last newsletter in September ....

Our annual symposium was a huge success with close to 60 people enjoying an engaging two day journey from the base of the Tararua Ranges, down the Ruamahanga River system to the coast at Palliser Bay. A special thanks to all of the high calibre speakers that presented over the two days including Chris Laidlaw (Chair Greater Wellington Regional Council), Nelson Rangi (Chairperson Kahungunu ki Wairarapa), Pim Borren (CEO Masterton District Council), Michael Bassett-Foss (Project Director Wairarapa Water Use Project), Peter Gawith (Chair Ruamähanga Whaitua) as well as the all of the others that contributed to the success of this event. A special thank you to our sponsors who are essential in ensuring these events are enjoyable and affordable – Silver Sponsors – AECOM, Tonkin & Taylor and Cardno, Bronze Sponsors DHI and the poster session sponsor Boffa Miskell. For those unable to make the symposium there will be videos of our mini-presentation session (10 x 2-3 minute presentations) uploaded to the Rivers Group website in the coming weeks.

During the symposium we also presented the Arch Campbell award to an extremely deserving individual who has been at the leading edge of technical excellence in river engineering and management for nearly 40 years – Peter Blackwood. Congratulations Peter, thoroughly deserved and it was fantastic for Derek Wilshire to read your citation and present this award given that both of you had personal stories to share about working with Arch Campbell. We will also be posting the video of the presentation of this award, including some fantastic history on Arch Campbell shared by Derek, on the Rivers Group website in the coming weeks.

During the course of the symposium we held our AGM and elected our management committee for the coming year. The committee for the 2016 year is Sarah Basheer, Jon Tunnicliffe, Mark Pennington, Brian Kouvelis, Laddie Kuta, Graeme Campbell, Alistair Allan, Mark Hooker, Kyle Christensen, Sjaan Bowie and Jo Hoyle. The election of officers will be completed at the first committee meeting of 2016 scheduled for the 9th of February in Wellington. A special word of thanks to retiring committee member Jan van der Vliet, his hard work over the past three years has been vital to our success particularly in securing sponsorship for our events.

It also very exciting to announce that for the first time we are actively supporting river related research and projects. We have contributed $8,000 to three PhD research projects - Hydrological Limits Setting: The missing tool for river management (Massey), Aquatic macrophyte management trials in lowland Canterbury drains to reduce flooding risk to agricultural land (University of Canterbury), Spatial impacts of the Canterbury earthquakes on inanga spawning habitat and implications for waterways management (University of Canterbury). We have also contributed $4,000 across two other projects - Canterbury demonstration site for managing water quality in agricultural drains and
Riparian margin/stream restoration for the Mangaotai stream (Hawkes Bay).

I wish you all a very merry xmas and look forward to seeing you at one of the great events we have lined up for the first few months of the New Year.

Kyle Christensen

Chairman

New Zealand **Fish Passage** Advisory Group
advisorygroup@fishpassagenz.org • doc.govt.nz/fishpassage

THE NATIONAL FISH PASSAGE ADVISORY GROUP UPDATE

Sjaan Bowie
Dept of Conservation Christchurch

New resources available from the New Zealand Freshwater Fish Advisory Group
Eel Activity Sheet:
The Advisory Group in collaboration with Riverscapes Freshwater Ecology have created a cool new "Awesome Eels" children's activity sheet. It has a series of activities that cater for all ages; with simpler activities like drawing your own eel for the younger kids and a word finder and code crackers for the older ones. It aims to teach kids about our special Longfin eel and how important providing fish passage is. Please check out this great resource and use it http://www.riverscapes.co.nz/free-downloads.html (at the bottom of this page) or on our resources page.

New Retrofit Guidance Available:
A series of case studies are planned that provide a summary of key information and guidance about attempts to improve a variety of different types of fish passage barriers in New Zealand waterways. These "Lessons learnt" are aimed at providing environmental staff, ecologists, engineers and general public with examples of remediation actions, the methods and success.

The first case studies looking at remediation of culverts using fish ramps, baffles and spat rope have been finalised and are available on our website via http://www.doc.govt.nz/nature/habitats/freshwater/fish-passage-management/how-you-can-help/.

Other progress:

- Started the collation of research gaps and currently establishing a prioritisation framework
- Scoped a national assessment protocol and database
- Begun work on the creation of a fact sheet on key design criteria for culverts to ensure fish passage
- Initiated scoping the development of national guidelines for fish passage management
- Provided a submission on the proposed NES for Plantation Forestry

Check out our web pages for the latest information and guidance, and email us if you wish to subscribe to this newsletter and keep updated with our progress

A GAME CHANGER FOR ADAPTIVE POLICY PATHWAYS PLANNING

Judy Lawrence
Victoria University Climate Change Research Institute

Regardless of any agreements made by global leaders in Paris this year, the world will be impacted by changes in the climate. New Zealand is no exception with increasing frequency and magnitude of floods, rising sea levels and increased fire risk being the most likely impacts according to the Intergovernmental Panel on climate change.

In New Zealand, local and central government are getting a chance to experience plausible climate change scenarios using a simulation game designed to challenge their policy choices. The Sustainable Delta Game, first developed at Deltares, an applied research institute in the Netherlands, has been tailored for a New Zealand setting in a project led by Judy Lawrence from Victoria University of Wellington's Climate Change Research Institute in collaboration with Marjolijn Haasnoot at Deltares an applied research institute in the Netherlands.

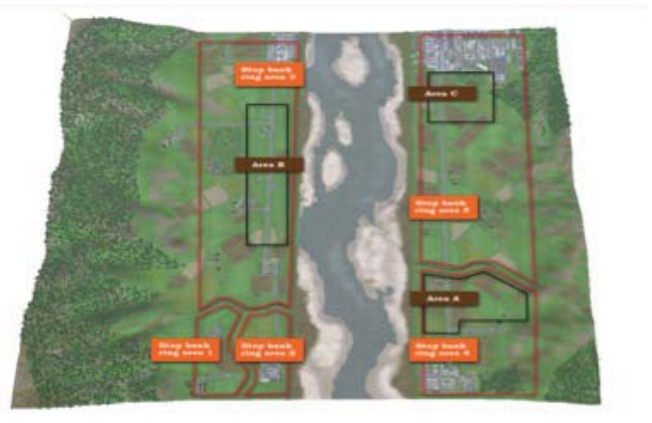
New Zealand precipitation, drought and sea level rise scenarios provided by NIWA have been included to drive the scenarios used. The NZ River and Coastal Games have also been styled visually to reflect New Zealand landscape and the available policy responses have been redesigned to be consistent with New Zealand institutional settings.

In the game users experience making decisions under conditions of uncertainty and change by developing an adaptive management plan for a river catchment or coastal area. They then get feedback on what happens over the next 100 years, implementing actions for specified time slices based on the environmental, economic and social changes signalled by the facilitator consistent with the scenarios used. Feedback is depicted after each simulation on the effectiveness and cost of their policy decisions. The objective is to develop an adaptive plan that has flexibility to accommodate the change in flood, drought and sea level rise over a 100 year timeframe and thus enable today's decisions to be more robust as change occurs.

The game enables players to experience the results of unpredictability, because we know that sea level is rising and flood and storm frequency and intensity is changing, but we do not know with certainty by how much, the rate of change and its magnitude. Users change their behaviour during the course of the game to make The New Zealand versions of the Game have been developed with additional funds from the Greater Wellington Regional Council, Wellington City Council, Tasman District Council and the Ministry for the Environment. It will be available for councils across New Zealand as Judy rolls it out later this year by testing in different localities and trains council staff to use it.

The game has already been used for long-term decision making for flood management in the CBD section of the Hutt River where it was used to start adaptive policy pathways planning for identifying a range of policy options that could maintain the high levels of flood protection required to manage changing climate impacts. Such application will also be facilitated by the development of a pathways driver currently being developed and tested by Deltares.

Further information and requests for Game session can be directed to judy.lawrence@vuw.ac.nz and further information about the Sustainable Delta Game can be found at https://www.deltares.nl/en/software/sustainable-delta-game/



The Rivers Group are hosting a Game in Wellington on 14th March 2016. See what's on in 2016 (pg 13) for futher information.

MAJOR WHANGANUI RIVER FLOOD JUNE 2015

Peter Blackwood
Horizons Regional Council

Over the period 19-21 June 2015 the Manawatu-Wanganui Region experienced very major flooding. The event first showed its severity late on Friday night 19th, when severe flooding on the Waikawa Stream reached a peak flow of 213 cumecs at the North Manakau Road site, resulting in failure of the bridge approaches on State Highway One. This was more than double the previous highest recorded flood peak and provisionally is larger than the current 200 year ARI estimate.

Over the next two days severe flooding continued throughout the Region with the Oroua River peak flow being a 50 year ARI, though well short of the damaging 250 year flood of February 2004. Other large flows were in the Makino Stream (100 year ARI), Tutaenui at Marton (60 year ARI) and Lower Mangawhero-Whangaehu sites (120 year ARI). However, this time it was in the Whanganui River where the extreme impacts were felt. The Whanganui at Te Rewa (ex Paetawa) site recorded a huge flow 4755 cumecs flow (16m rise), 85 year ARI. This is the largest flow ever recorded in the Whanganui River. This may have been the second largest flood recorded in the North Island and the largest for 77 years, being second to the renowned Mohaka Flood of 225,000 cusecs (6,400 cumecs), which devastated the Esk Valley in 1938.

Of considerable importance was that flows were substantially greater downstream at Wanganui City, with the peak flow and return period still being carefully decided, and most likely in excess of 100 years. The difficulty in quickly providing a return period through Wanganui is the significant contribution of lower catchment inflows, which were abnormally large for this flood. For example on the Matarawa Diversion tributary flows were 60% higher than the 100 year flow.

Figure One presents detailed modelling of rainfall frequencies for the significant 48 hour duration – the frequency based on HIRDS V3 data. Whilst rain was heavy in the ranges, there was a severe band of rain closer to the coast that exceeded forecasts. This storm was characterised by persistent moderate to high intensity rain, with short duration frequencies not high, very similar to the 2004 storm. Furthermore, there had been a lot of rain in the region since early April, with this was reflected in high flows throughout the western areas of the Region exceeding the rainfall return periods.

Through Wanganui City there was severe flooding both from the Whanganui River and several watercourses through the City. Depths of flooding in Anzac Parade were close to 2 metres in several houses with around 60 houses flooded from the Whanganui River there and significant flooding of the CBD on the opposite bank. Refer Photo One.

Around 170 flood levels were surveyed following the flood. There were relatively lower levels from Putiki downstream. This was due to the peak occurring close to mid-tide, no storm surge and significant scouring in the lower rivermouth area enhanced by the peak occurring on an ebb tide. Computer modelling concords well with these levels.

In contrast at Aramoho and upstream levels were very high. They reached inside the top floor of the Aramoho Rowing Clubs, some 3.5 metres above ground level, an event previously consider very unlikely. In one reach levels were 0.6 to 0.7m different on opposite banks of the river, due to exposed areas feeling the full force of the rivers waves and swash, with the opposite bank sheltered. Once a river resurvey is completed there will be a challenging modelling exercise.

Photo 1: Severe flooding of Anzac Parade Houses Saturday 20 June 2015. Photo taken 7 hours after 3am flood peak. Photo taken Tane Humphrey, Horizons Regional Council

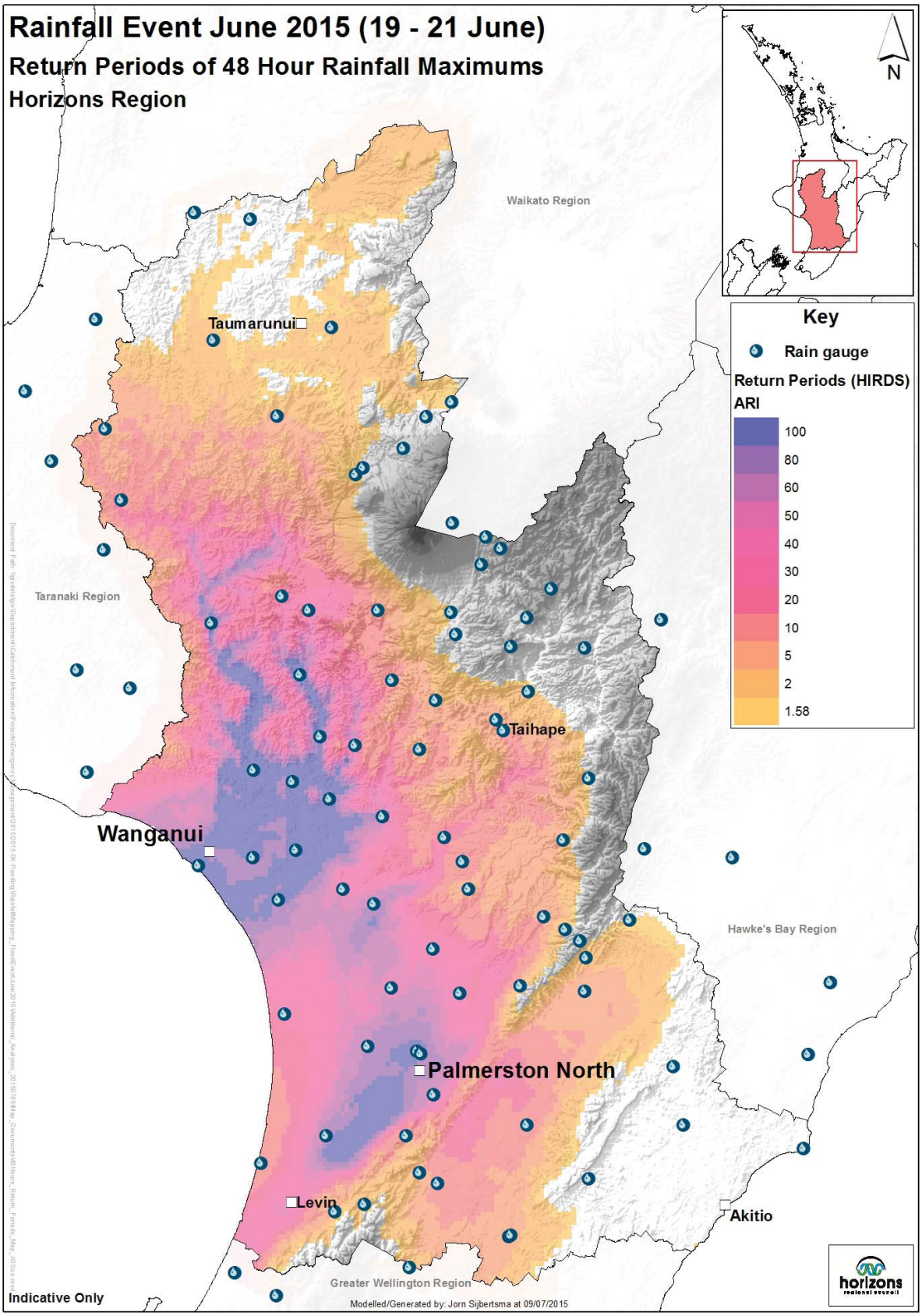


Figure 1: Rainfall Return Periods – Produced by Jorn Sijbertsma, Horizons Environmental Information Analyst

RAISING FLOOD AWARENESS TO REDUCE FLOOD RISK

Daria Golub
Greater Wellington Regional Council

Flood risk in the Greater Wellington Region is addressed through the process of floodplain management planning. The flood protection department takes a holistic approach to identify various issues in the catchment and develop an appropriate management plan. Raising flood awareness intends to increase public acceptance of flood hazard information and triggers behaviour change toward flood-conscious land use planning and flood preparedness at household level.

A number of floodplain management plans have been developed or are currently under development for the Wellington region. During the early stages of plan development, modelled flood hazard maps for large flood events are produced and released. These maps often show inundation of properties in rural and urban areas. While at times a small number of the community are able to relate these maps to observed historic flooding, for many more it is unbelievable even when there are records of significant floods in the past. This is not surprising, since many of the last major floods in the Wellington region occurred in the middle of last century (Hutchins, 2006), and studies have shown that people tend to forget about natural disasters three years after a significant event (Timar L. et al, 2014). In day to day life we all cope with a huge range of risks aside from worrying about rare and short flood disasters and our capacity to consider and remain aware of rarer risks is limited. Despite the Encyclopedia New Zealand stating that flooding is the most costly natural hazard in New Zealand. Greater Wellington Regional Council, District and City Councils together with their governance groups and community look at options to manage flood risk on floodplains. It is a challenging task, the Wellington region contains towns built near the rivers on alluvial floodplains which historically featured many streams that are often now piped and forgotten about. Moreover, many of these rivers have been straightened and stopbanks have been built just alongside the river edges to provide higher flood security which encourages and allows further development. While sections of these stopbanks are often of sufficient height to manage large floods, there are concerns regarding their proximity to active flows, past erosion damage and uncertainty about the quality control at time of fabrication, as well as an uncertain future of climate change. This forces consideration of residual risk and as a result options such as stopbank reinforcement, realignment or retreat, as well as community preparedness for disasters. These projects to improve flood risk management cannot be delivered in isolation and sit alongside various options for ecological, landscape and urban design to improve connectivity of the river and urban space, improve the quality of life for communities, enhance the mauri of rivers and treat our waterways as a national asset. These approaches require expertise across a range of disciplines beyond traditional engineering.

Ultimately the implementation of options and future development in flood prone areas depend on the decisions made by local residents, stakeholders and politicians. If the public does not believe the flood risk, does not believe climate change is real it is unlikely that the best decisions for a flood secure future will be made. On the contrary, a flood aware public understands that rivers flood naturally and significant floods may occur once in a while. Individuals know that stopbanks are susceptible to failure and there is residual risk when development occurs behind a stopbank. A flood aware community knows about the options to avoid or minimise flood damages by following building controls or purchasing flood insurance. Thus raising flood awareness leads to behaviour change towards flood-conscious decision making.

A range of communication techniques in order to raise flood awareness are used throughout New Zealand, and further afield. These include flood markers, serious gaming, social marketing and media campaigns, etc. (Figure 2). These are an essential component of flood risk management and an investment equal in importance to technical modelling and design.

When the public has a realistic perception of flood risk, the right decisions are made regarding building controls, land use development, and community preparedness. The result of this is reduced vulnerability and increased resilience.

Fig. 1: Pinehaven stream 1%AEP flood hazard map (left) and the photo from the Pinehaven Stream flood event in 1976 (right).

Fig. 2: Examples of techniques to raise flood awareness: flood marker at the Hutt River, information campaign in UK, the Sustainable Delta Game in Greater Wellington regional council.

References:
Hutchins, G. 2006. High Water: Floods in New Zealand. Grantham House, 112p

Timar, L., Grimes, A., Fabling, R. (2014) That Sinking Feeling: The Changing Price of Disaster Risk Following an Earthquake. Motu Working Paper, Motu Economic and Public Policy Research

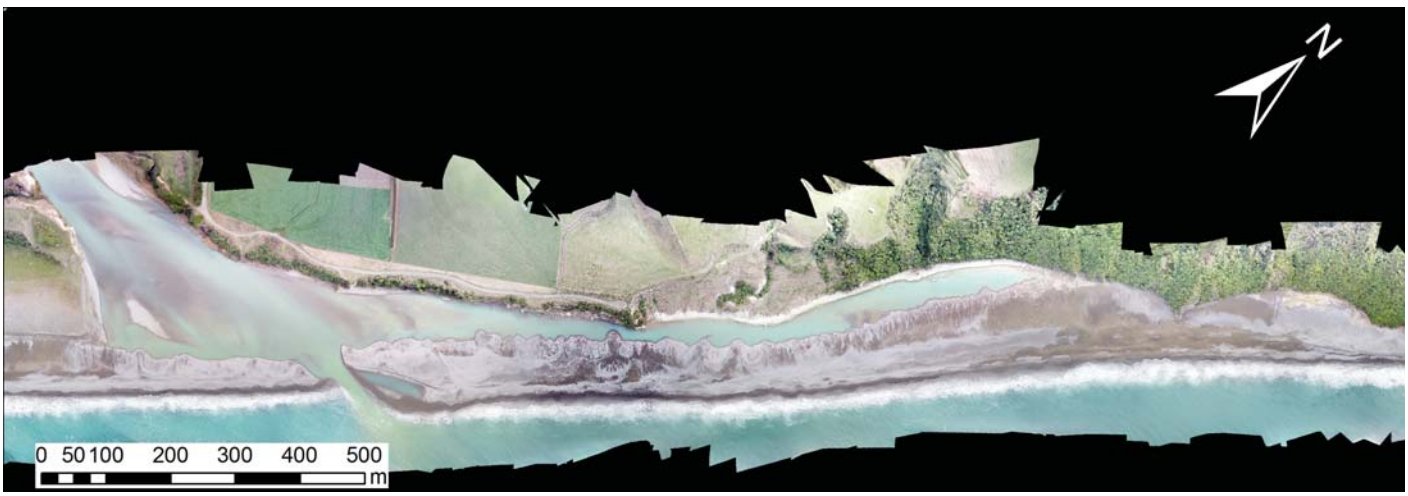
Encyclopedia of New Zealand (2015). http://www.teara.govt.nz/en/floods/page-1

MONITORING HAPUA OUTLET DYNAMICS

Richard Measures
NIWA Christchurch

Non estuarine river mouth lagoons known as hapua exist at the mouths of many of New Zealand's gravel bed rivers. Hapua are separated from the sea by mixed sand and gravel barrier beaches and have highly dynamic outlet channels which can rapidly migrate along-shore, change in width and length, or close for short to sustained periods of time. They are associated with important ecological, cultural and recreational values, and hapua outlet morphology has a controlling influence on lagoon water quality, flood risks to adjacent land and diadromous fish passage. Hapua are influenced by changes in flow regime, sea-level rise and management activities such as artificial mouth opening and construction of groynes or bank protection.

An intensive data collection campaign including surveys, water level and salinity monitoring, and time-lapse photography is being conducted at the Hurunui hapua in North Canterbury. Post processing this data allows hindcasting of outlet flow rates and measurement of outlet size and position. The monitoring and data post processing techniques being developed and trialled on the Hurunui hapua will be useful for operational monitoring of other river mouths. Data collection is ongoing but initial analyses are already providing insight into the balance between wave, river flow and tidal influences on outlet and barrier morphology. The overall aim of this research is to allow better prediction of the effects proposed or predicted changes affecting hapua. For example water allocation or management interventions.



HUTT CITY CBD FLOOD PROTECTION SCHEME

Graeme Campbell

ABSTRACT
"A Dynamic Adaptive Approach to Options Assessment"

- Deep Uncertainty Workshop Deltares Netherlands 3-4 November 2015

The community in the Hutt valley, New Zealand are protected by one of the largest flood control schemes in New Zealand. The floodplain is also the most densely populated floodplain in New Zealand, including significant road, rail and water infrastructure essential for the region. The community have decided on a level of protection (1:440 ARI) that should be maintained for at least 100 years. Climate change will reduce that level of protection as flood frequency and magnitude increase. The Greater Wellington Regional Council, responsible for flood risk management along with the two city councils who manage land use and developments protected by the flood scheme, have a challenge to maintain protection levels when there are affordability limits. The new information on climate change has suggested that the desired standard of flood protection can not be provided within the existing river corridor and that additional land, currently occupied by building development, may be required for flood mitigation structures.

This paper outlines how knowledge of the effects of climate change on flood frequency and magnitude has influenced how we have approached the completion of the flood scheme adjacent to the Hutt CBD. We adopted the Dynamic Adaptive Policy Pathways (DAPP) approach in a real-life decision setting to assess options and do costings for the scheme completion. The problem, context and decision process are presented using the DAPP. The issues that arose during the process, how the DAPP was used for long term management of a dynamic river system, provides a case example for feedback from workshop participants.

EVALUATION PROCESS SUMMARY

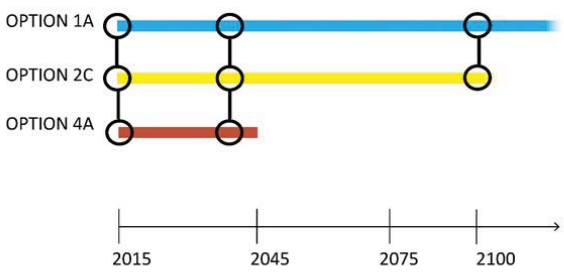
Option 2C (widens west) and 4A (stays in corridor) for consultation

Option 1 may be needed in 100 years – not consulting as option

Outcome could be progressive ...

Option 4A then Option 2C
or
Straight to Option 2C

Note that 4A gives only to 2035 before planning needed for next option



greater WELLINGTON
REGIONAL COUNCIL
Te Pane Matua Taiao

AUCKLAND'S STUDENT EVENT

The University of Auckland's School of Environment and Faculty of Engineering met for the River Research @ Auckland symposium, which brought together students with backgrounds in River Ecology, Fluvial Geomorphology, as well as Civil and Environmental Engineering. Postgraduate students presented their work in various river domains. Laura Buckthought provided an overview of river and freshwater research initiatives at Auckland Council, and Gary Brierley provided some perspectives on emerging trends in cross-disciplinary river work. Students had positive comments on this opportunity to build stronger linkages between river researchers at the University of Auckland.

Anya Leenman was awarded the Stephen Coleman Student Prize from the Rivers Group, for her work on alluvial fans as sedimentary stores and linkage points in a large dendritic river system in the East Cape. Her presentation on her field and remote sensing work showed off cutting-edge techniques in high-resolution landform analysis and modelling.

THE CANTERBURY WATERWAYS GROUP STUDENT EVENT

Waterways Centre for Freshwater Management held their Postgraduate Student Conference on the 17th November, The IPENZ Rivers group was a gold sponsor for this Conference.

The event showcased research on waterways at both University of Canterbury and Lincoln University covering research relating to freshwater management in ecology, engineering, social sciences, chemistry, economics and resource management. For further information see http://www.waterways.ac.nz/conferences_workshops/pgstudentconf.shtml

There was a high calibre of talks presented on a wide variety of topics related to river management including algae, kekewai/koura, invertebrates, glacial particulate matter, pollution management, riparian management, arsenic, metal and nitrogen contamination and stormwater management. In addition to sponsorship, the IPENZ Rivers Group awarded two student prizes:
Best overall River Management talk was given to Richard Measures (PhD student) for his talk on "Monitoring hapua outlet dynamics". A $150 cash prize and a copy of the "Rivers" Book was presented.
A runner up prize was given to Malea Zygadlo (Masters student) for her talk on "Metal contamination in streams in three NZ cities, their accumulation in benthic communities and implications for mahinga kai".

Richard Measures

WHAT'S BEEN IN 2015

2015 SYMPOSIUM

A successful Annual symposium was held in the Wairarapa region with a "Mountans to Sea" theme. About 66 attandees enjoyed a symposium on the move through two days of travelling from the Tararua Ranges to Palliser Bay.
Videos of the mini-presentations and of the Alan Campbell Award will be available on the Rivers Group website in Janurary.

Photo: Wolman pebble count demonstration on the Waiohine River during the 2015 symposium – photo taken from the Cardno unmanned aerial vehicle.

2015 AGM ANNOUNCEMENTS

The AGM was held on the 13th November. Your committee for 2016 is as follows:

Kyle Christensen
Laddie Kuta
Graeme Campbell
Alistair Allan
Sjaan Bowie
Jon Tunnicliffe
Sarah Basheer
Mark Pennington
Jo Hoyle
Brian Kouvelis
Mark Hooker

THE RIVERS GROUP ARE SUPPORTING NEW RIVER RESEARCH

This year we have provided financial support to the following projects.

(1) Public Projects Fund:
$3000: Canterbury demonstration site for managing water quality in agricultural drains (University of Canterbury, CAREX, Landowner)
$1000: Riparian margin/stream restoration for the Mangaotai stream / Stage 1 Weed Control (Argyll East School, Otane, Hawkes Bay)

(2) Student Research Grant:
$3000: Hydrological Limits Setting: The missing tool for river management (Massey, PhD work)
$2500: Aquatic macrophyte management trials in lowland Canterbury drains to reduce flooding risk to agricultural land (University of Canterbury, PhD work)
$2500: Spatial impacts of the Canterbury earthquakes on inanga spawning habitat and implications for waterways management (University of Canterbury, PhD work)

Total:
$12,000

We look forward to sharing the knowledge gained from this work.

WHAT'S ON IN 2016

1. Delta Games Wellington March 14th
2. Culvert workshop Auckland March 22nd
3. World Fish Migration Day May 21st
4. River Management Design workshop Wellington May (date TBC)
5. Rivers Group Annual symposium in conjuction with NHS and IEA Queenstown 3rd December
6. Regional Student events, dates TBC
7. Contestable Research Funds round august (TBC)

DELTA GAMES

The Sustainable Delta Game by Deltares Preliminary Notice
Date: 14th March
Contact: Alistair Alan GWRC

The serious game about water management. 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?

https://www.deltares.nl/en/software/sustainable-delta-game/

Time: 5pm – 9.30pm
Venue: Wellington
Numbers: Limited to 30
Registration + Cost: Details provided in January 2016
Catering: Pizza and Beer

CULVERT DESIGN WORK

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)

manatiaki kōawa rivers GROUP
A joint technical interest group of IPENZ & Water NZ

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

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

Formal registration opens through IPENZ 1st February 2016
- Spaces limited to 40 participants on first come basis

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

WORLD FISH MIGRATION

WORLD FISH MIGRATION FOUNDATION

This international event calls attention to the need to safeguard free flowing rivers and to restore the connections in rivers for migratory fish. On this day, celebrations and events will start in New Zealand, and follow the sun around the planet until it sets on Hawaii. World Fish Migration Day in 2014 had 273 events, in 53 countries, with contributions from 1000 different organizations (e.g. http://www.doc.govt.nz/news/stories/2014/may/celebrating-world-fish-migration-day/). There is already an exciting array of events planned, varying from a public education events, river tours, aquarium displays, dam removals to playing a human board game called "The migratory fish".
Please put this date in your calendars and keep it in mind when planning events. If you are interested in running a local event please register it at www.worldfishmigrationday.com.

Web: www.worldfishmigrationday.com
Facebook : facebook.com/WorldFishMigrationDay
Twitter: @fishmigration
www.fishmigration.org

INVITATION | WORLD FISH MIGRATION DAY | MAY 21, 2016

FOR PEOPLE WORKING FOR RIVERS AND MIGRATORY FISH AROUND THE WORLD

The World Fish Migration Platform invites you to join the second World Fish Migration Day on May 21st, 2016.

Following the overwhelming success of the first World Fish Migration Day in 2014, this international event calls attention to the need to safeguard free flowing rivers and to restore the connections in rivers for migratory fish.

CONNECTING FISH, RIVERS AND PEOPLE

MORE INFORMATION

Web	www.worldfishmigrationday.com
Facebook	facebook.com/WorldFishMigrationDay
Twitter	@fishmigration #WFMD2016

ORGANISED BY

WWF · LINKIT CONSULT · FFSG Freshwater Fish Specialist Group · Waterschap Brabantse Delta · WORLD FISH MIGRATION FOUNDATION · Waterschap Amstel, Gooi en Vecht · The Nature Conservancy Protecting nature. Preserving life. · Hollands Noorderkwartier

SPONSORED BY

PROGRAMMA NAAR EEN RIJKE WADDENZEE · patagonia · Sportvisserij Nederland · ARK NATUUR ONTWIKKELING · Rijkswaterstaat Ministerie van Infrastructuur en Milieu

28 NOV - 2 DEC

2016

QUEENSTOWN

Joint Conference for the

56th New Zealand Hydrological Society &
37th Australian Hydrology and Water Resources Symposium

Including 7th IPENZ Rivers Group

WATER, INFRASTRUCTURE AND THE ENVIRONMENT

www.nzhs016.co.nz

NEW ZEALAND HYDROLOGICAL SOCIETY

ENGINEERS AUSTRALIA

manatiaki kāawa
rivers GROUP
A joint technical interest group of IPENZ & Water NZ