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

Issue 11: August 2014 ISSN 1179-674X

INSIDE THIS ISSUE

FROM THE CHAIR

Mark Pennington, Chairman of the Rivers Group

A very warm welcome to this, the latest edition of the Rivers Group newsletter, FLOW. I trust that it contains articles to appeal to all members.

Our biggest events that are coming are detailed in this newsletter, these being a re-run of a previously successful culvert design workshop and our annual symposium. The culvert design workshop will, once again, contain a mix of theory and practice and we hope that you support this with registrations. As always we aim to keep costs to a minimum with these types of events, recognising that the major cost comes in your time for attendance.

The up-coming conference is your opportunity to network and learn from peers, and we strongly encourage your participation by submission of papers. We depend on your support of this event in making it the success that it promises to be. Please feel free to contact any of your committee for further information, or follow the links provided in the newsletter. In the past we have partnered with the WaterNZ Stormwater conference in the hope that Rivers Group members would be supportive in presentation of papers. In recent years this appears not to have appealed to our members, evident by the modest number of papers submitted. We sincerely hope that we are able to meet the needs of our members by providing this new opportunity, with the NZ Hydrological Society and NZ Freshwater Sciences Society, for presentation of rivers-related papers.

Also at the symposium we will hold our AGM, and this serves as advance notice of that. In addition we have a number of awards to make, the most notable of which is the Arch Campbell Award and a further notice seeking nominations will be out soon.

We continue to invite ideas from the membership as to possible themes or events that they'd like to see co-ordinated by the Rivers Group. Check our website for information updates as they arise, and be sure to let us know of potential future activities and articles that we can distribute further to the group membership. We'd love to hear from you and have you be part of growing the group to be of value to our membership, rivers users throughout New Zealand, and also society in general. ≈

THE KAITUNA RIVER RE-DIVERSION AND WETLAND CREATION PROJECT

P. De Monchy

Bay of Plenty REGIONAL COUNCIL

The Kaituna River's natural path flows into the Ongatoro/Maketū Estuary, carrying freshwater from Lakes Rotorua and Rotoiti as well as tributaries from the hills around Te Puke. In its lower reaches the river meanders through plains which, in the past, included the 6,100 hectare "Kawa Swamp". The wetlands provided Te Arawa tribes and early settlers with food, habitat and a thriving flax trade in the past, and played a major role in the ecology and economy of Maketū. The wetland area was progressively drained for farmland and today only around 120 hectares remain.

The Kaituna River naturally blew out to sea through the sand dunes at an ox-bow known as Te Tumu (some 3.5km west of the estuary mouth) during large flood events but would gradually migrate back to the rocky headland at Maketū over time. In 1956 the Kaituna River Board (heavily subsidised with funding from the Ministry of Works) sought to reduce flood risk and improve

land drainage in the lower catchment by permanently diverting the Kaituna River out to sea at Te Tumu and blocking the river's access to the estuary. By removing the freshwater contribution to the estuary, these works led to significant coastal sediment deposition in the estuary, as well as raising salinity. This increased salinity, as well as some further land drainage, reduced wetland vegetation around the estuarine margin by 95 percent. Both effects had a negative impact on shellfish and other food resources in the estuary.

The Maketū Action Group formed in 1978 and lobbied for a return of the Kaituna, including a 3,000 signature petition delivered to parliament by the late Te Arawa MP and former Speaker Sir Peter Tapsell. In 1988 the Department of Conservation was tasked with restoring the estuary and implementing a partial re-diversion of the river, but this effort was limited to 3.5 percent of the river's flow by very high bacterial contamination (the lower Kaituna had a median 1,000 faecal coliforming units per 100 ml of water) and any benefits have been limited as a result.

Bay of Plenty Regional Council's construction of the Ōhau Channel wall, built to reduce the risk of algal blooms in Lake Rotoiti by diverting Lake Rotorua water directly into the upper Kaituna, prompted renewed concern from Maketū residents. This led to a Joint Council Committee and the creation of the Kaituna River and Ongatoro/Maketū Estuary Strategy to ensure that as a wider community the policies and plans, activities and actions "celebrate and honour Kaituna River and Ongatoro/Maketū Estuary life as taonga - Whakanuia, whakamawawatia te mauri ō te Kaituna me Ongatoro hei taonga".

As a partner to the Strategy, Bay of Plenty Regional Council has set up the Kaituna River Re-diversion and Wetland Creation Project and allocated $6.2 million to implement the strategic and management actions assigned to it. These include the following goal:

To significantly increase the volume of water (particularly fresh water) flowing from the Kaituna River into Ongatoro/Maketū Estuary by 2018 in a way that maximises the ecological and cultural benefits (particularly wetlands and kaimoana) while limiting the economic cost and adverse environmental effects to acceptable levels.

Bay of Plenty Regional Council has now chosen its preferred option. Modelling of the preferred option (see attached) will re-divert some 20 percent of the river's flow into the estuary while keeping Te Tumu cut open for flood protection and drainage, and will re-create at least 20 hectares of new wetland habitat. The project team's current focus is on further modelling and investigations to prepare an Assessment of Environmental Effects for the resource consents and Notice of Requirement to designate land.

Subject to consenting and land acquisition, construction is scheduled to begin in 2015/16. The capital budget for land acquisition and construction is $4.1 million. The remaining $2.1 million project budget covers the cost of the project team, consultants and contractors in planning, delivering, operating and monitoring the project, including consenting and legal costs.

The collection of information and subsequent modelling and assessment has cost around $700,000 to date. The legal and planning costs directly associated with the resource consents and land acquisition are expected to cost around $600,000 and take up to three years, but that depends significantly on the extent and outcome of any appeals. This is high relative to the project budget, but reflects the complexity and level of effects of the proposal, and the likelihood of appeals. The main environmental effects of interest to the community are ecological, cultural, flooding and land drainage, erosion, land use (two land areas are required for the project, and another will lose land access and become an island again), navigability (both through Te Tumu Cut and the estuary entrance) and recreational. ≈

Published & Available

THE INTERNATIONAL LEVEE HANDBOOK – A COMPREHENSIVE GUIDE AND DECISION SUPPORT FRAMEWORK FOR OWNERS, MANAGERS, AND DESIGNERS OF STOPBANKS

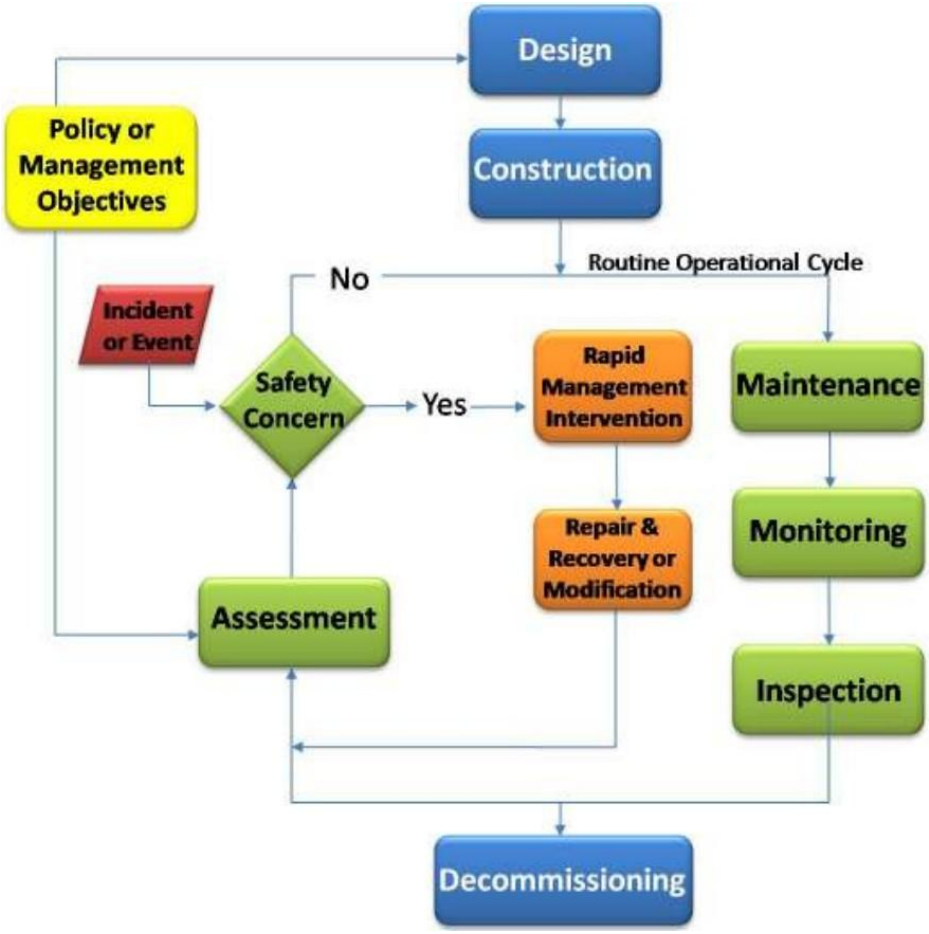
Stopbanks to defend against flooding remain a critical part of flood risk management. The effects of ongoing climate and socio-economic change have been exemplified by the serious disasters in recent years in USA (Hurricanes Katrina and Rita) and France (Tempête Xynthia) where extensive loss of life and property damage occurred following stopbank failures or overflows. An international team from France, USA and UK/Ireland supported by Netherlands and Germany identified the need for a new comprehensive guidance handbook and begun working on the document in 2009. After four years of international collaboration, the 1350-page handbook was published in 2013. It has been written by experts and practitioners from the participating countries in the project consortium and draws together scientific knowledge and practical experience.

The International Levee Handbook is a compendium of good practice, offering comprehensive guidance on the design, construction, maintenance and improvement of stopbanks and describing an international state of the art on these matters. Also, it offers a decision support framework for competent engineers, rather than a prescriptive decision making code of practice, looking at specific challenges during the life cycle of stopbanks.

The work is now available to buy from the following link:http://www.ciria.org/service/ILH
Or download: http://www.ciria.org/service/ILH download

A miscellaneous image (1960s) with a reminder as relevant today as the day it was photographed

Further information on the International Levee Handbook project can be found at:
http://www.leveehandbook.net/about-project.asp ≈



The Life-Cycle of a Stopbank

FINDINGS FROM FIELD INVESTIGATIONS OF SIX FISH SCREENS AT IRRIGATION INTAKES

M. Bonnett (NIWA)
S. Bowie (DOC)
A. Meredith (Environment Canterbury)
P. Reese (Irrigation New Zealand)
M. Webb (Fish and Game New Zealand)

The multi-agency water intakes working party (NIWA, Department of Conservation, Environment Canterbury, Irrigation NZ, and Fish and Game) have recently finalised findings from six field investigations of a range of water intakes in Canterbury, which look at the key design criteria that best prevent entrainment and impingement of fish. Further work is planned with the Engineering department of Canterbury University to run experiments to specifically test design criteria in a hydrologic flume.

Summary of Bonnett et al (2014):
Irrigation and stockwater intakes from rivers in Canterbury are required to exclude, or "screen", fish that might otherwise become entrained within the irrigation system and be lost. Guidelines for the design and operation of fish exclusion devices ("fish screens") have been developed, and these recommend screen apertures, water velocities, and other fish diversion measures (Jamieson et al. 2007). In order to assess the suitability of the guideline specifications for fish screens, field tests of six operating fish screens were reviewed. The screens tested represented the most common types of screens already installed in the Canterbury region and did not include "end of pipe" solutions.

Information from each of the investigations was reviewed to assess the validity of seven criteria outlined in "*Fish screening: good practice guidelines for Canterbury*" (Jamieson et al. 2007, hereafter the 2007 Guidelines): site location; screen apertures; approach velocity; sweep velocity; bypass provision; bypass connectivity; operation and maintenance. Not all the criteria could be quantified during the tests, and therefore these trials were not a specific test of the individual criteria but a test of the effectiveness of each screen, whilst gaining information on the key criteria.

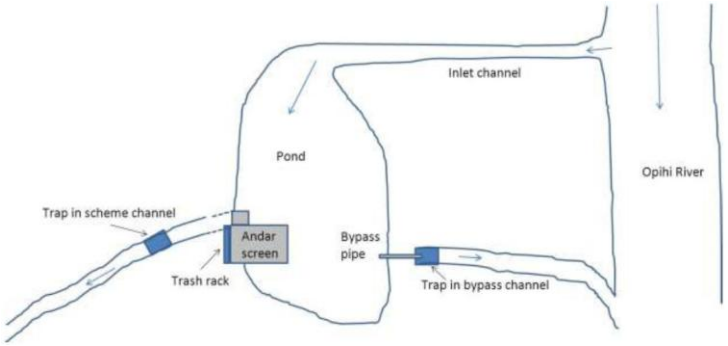
None of the six screens tested met all the criteria from the good practice guidelines, and none of the screens excluded all fish. From the tests conducted, the most critical features for effective fish screening were the provision, design and connection of suitable bypass facilities, and the correct fitting, maintenance and operation of screens.

There are presently no criteria specifying the quantity or proportion of water that should flow through a bypass; as this is an important factor that affects both sweep velocity and connectivity, some guidelines need to be developed.

The investigations showed that, overall, the guidelines are appropriate for protection of fish communities in our rivers.

Trials conducted on intakes that utilised infiltration galleries or permeable rock bunds to screen fish demonstrated that these types of screen provide effective (close to 100%) exclusion of juvenile salmon, however they are less effective for very small salmon and trout and some native fish.

Fishing in the vicinity of the intake screens provided some information on which species of fish inhabit these areas and which may be at risk – either from becoming entrained within the irrigation schemes or by predation near screens. It is recommended that further research on the life cycles, distribution, migratory habits, swimming ability, and size of native fish in New Zealand rivers is undertaken to ensure that the 2007 guidelines are appropriate for native fish.



Sketch of trial set-up for one of six fish screens

Water intake set up looking across to the Andar screen sketched above

Jamieson, D., Bonnett, M, Jellyman, D & Unwin, M. 2007: Fish screening: good practice guidelines for Canterbury. NIWA Client Report CHC2007-092

For the full report go to http://irrigationnz.co.nz/about-us/our-work/projects/fish-screen/:
Bonnett M, Bowie S, Meredith A, Reese P, Webb M. 2014. Findings from field investigations of six fish screens at irrigation intakes. NIWA publication, Christchurch. CHC2014-045. ≈

WORKING TOWARDS IMPROVED FISH PASSAGE MANAGEMENT IN NEW ZEALAND

P. Franklin (NIWA)
S. Bowie (DOC)

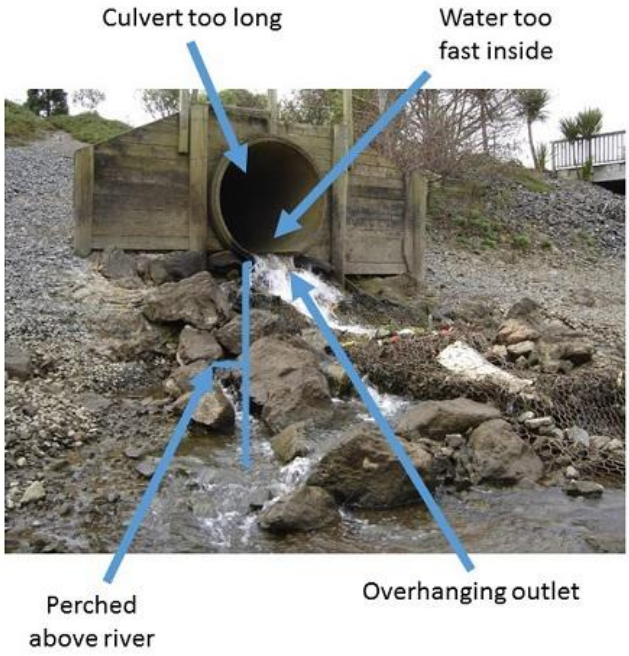
A lot of progress has been made on better national coordination of fish passage management in New Zealand in the last year.

Many of New Zealand's iconic freshwater fish species, such as whitebait and eels, undertake migrations between the sea and freshwater as part of their life-cycle. For example, whitebait lay their eggs in freshwater or estuaries before the larvae move out to sea after hatching. After a number of months growing at sea, they then return to our rivers and streams and migrate upstream as the whitebait that New Zealanders love to catch and eat – in their whitebait fritters. The ones that escape the whitebait nets and make it into our freshwater streams grow into adults before beginning the cycle all over again. Unfortunately, these movements are increasingly being obstructed by structures commonly found in our rivers and streams, such as culverts, weirs, tide gates, and dams. These barriers can delay or prevent fish from reaching their habitats, thus contributing to the decline and loss of these fish in many of our waterways over time.

In New Zealand's waterways, the Department of Conservation (DOC) and Regional Councils have specific responsibilities to manage fish passage under the Freshwater Fisheries Regulations 1983 and Resource Management Act (RMA) 1991, respectively. The regulations require that no structure should impede the passage of fish. However, there are still many poorly installed in-stream structures that restrict fish migrations and prevent fish from accessing critical habitats. For example, in the lower Waikato River it has been estimated that access to around 1,100km of tributary streams is restricted by tide and flood gates alone. That's equivalent to a river running all the way from Auckland to Christchurch that fish can't fully access!

With a high number of our freshwater fish species in decline, there is increasing concern about how migration barriers impact on their numbers and distribution. To address these concerns, in November 2013 around 90 ecologists, engineers, and other experts from around the country met at a two-day workshop in Wellington to discuss how to improve the management of fish passage in New Zealand's rivers. Some of the key themes that emerged from the workshop were:

- A need to improve access to resources providing guidance on managing fish passage;
- The requirement for research to fill gaps in our knowledge about fish and their ability to pass different structures;
- The importance of installing fish passage solutions that meet best-practice designs; and
- The need for greater collaboration between ecologists and engineers to find effective solutions for enhancing fish passage at in-stream structures.



A typical example of a fish migration barrier caused by a poorly installed culvert

The whitebait life-cycle

To help achieve these aims NIWA and DOC have recently agreed to work together to collate and develop national resources to support fish passage management in New Zealand. This will include setting up a new multi-agency National Fish Passage Advisory Group made of ecologists and engineers that will be responsible for developing and promoting best-practice methods for enhancing fish passage. As part of this project, we have launched a new fish passage website on World Fish Migration Day in May with the aim of improving access to the most up-to-date information on what you can do to help our freshwater fish in New Zealand. You can also find copies of the presentations and proceedings from the 2013 Fish Passage Workshop.

Tackling the problem of fish migration barriers is a national challenge, but one that offers a potentially cost-effective opportunity for significant biodiversity gains in our valued freshwater ecosystems. It is important before you do anything to know what fish are present at a location, because in a few key places barriers can be protecting threatened native fish from invasive fish species. However, in the majority of places you can help our freshwater fish by:

- Ensuring that structures in waterways are designed to allow for effective fish passage;
- Removing old structures that are no longer required;
- Working together to fix barriers and restore fish passage; and
- Contacting DOC or your local Regional Council if you are concerned that an in-stream structure is creating a fish passage barrier. ≈

10 YEARS ON FROM FEBRUARY 2004

A. Cook (Horizons Regional Council))

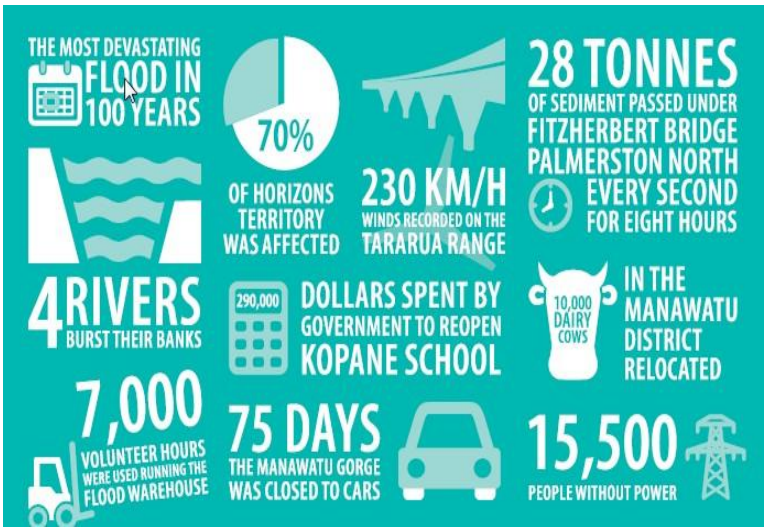
On Sunday 15 February 2004, Horizons Regional Council hydrology staff noticed rivers throughout the Region were rising rapidly. By 11pm it was clear opening the Moutoa sluice gates was inevitable. Horizons emergency management staff started calling the 22 farmers who lease land within the spillway to warn them to move stock by 7am. At this point the opening appeared to be no different from previous occasions. However, within hours it became apparent just how extraordinary this event would be.

Over the next few hours Air Force personnel from Ohakea evacuated hundreds of residents in Feilding. The townships of Tangimoana and Scott's Ferry were completely evacuated and the Manawatu Gorge and Saddle Road were closed. The Saddle Road Bridge collapsed, severing the main gas line to the Hawkes Bay, and two trains derailed due to floodwaters damaging the tracks. Farmers throughout the Region struggled to get stock to high ground, many facing inevitable losses as flood waters continued to rise. During the early hours of Monday morning both Manawatu and Rangitikei district councils declared a state of emergency.

At 8am on Monday 16 February the Moutoa sluice gates were opened. However, peak flows exceeded what the scheme was designed to handle and ultimately stopbanks breached in eight locations, most on the Oroua River. By this time there were also substantial breaks in roading, bridging, water supplies, sewage treatment, gas, electricity and telecommunications across the entire Region. 500 people had been evacuated, one house had completely washed away and 200 homes were flooded.

At 8pm on Tuesday 17 February Horizons Regional Council declared a state of regional emergency. Over the next nine days, Government departments and community agencies came together to assist with recovery efforts. Armed forces personnel helped with evacuations, delivered water to Feilding, handed out bedding and assisted with sandbagging and transport. Hundreds of Civil Defence volunteers manned phones and radios, stock were transported out of the Region, and Horizons staff liaised with emergency services, media, farmers and flood victims.

Emergency stopbank repairs were undertaken; first estimates of stock losses were recorded and a carcass disposal project was established; debris from around bridges was removed; water supplies and essential services were reconnected. At the end of the first week 920 people were still evacuated from their homes, 250 homes were affected and 16 schools were closed. By the time the regional state of emergency was lifted nine days after it was declared, the effects of this once-in-a-lifetime storm and the long road to recovery came to light.



WHAT WILL BE ACHIEVED BY JUNE THIS YEAR


Balgownie walkway and floodwall

Lower Whanganui Scheme

- 3km of new stopbanks and floodwalls at Balgownie
- 2km of upgraded stopbank at Kowhai Park
- Recreational access and amenity improvements at Balgownie


New Kopane Bridge

Lower Manawatu Scheme - Rural

- 32.1km of stopbanks raised on the Oroua River typically by up to one metre
- 26.5km of stopbanks raised on the Manawatu River and other tributaries
- Flood spillway and sluicegates on the Makino Stream to divert floodwaters from Feilding
- Flood and storm surge protection at Foxton Beach
- New bridge over the Oroua River at Kopane to remove a channel constriction
- Removal of approximately 220,000 cubic metres of gravel from the Oroua River
- Edge vegetation management over the full scheme length of Manawatu and Oroua Rivers to improve channel conveyance
- Substantial flood mitigation works in the Taonui Basin, including a 7.5 cumec flood pump (in conjunction with the Manawatu Drainage Scheme)


Makino Diversion Structure

Rangitikei Scheme

13.8km of stopbanks raised at Parewanui and Tangimoana

Lower Kiwitea Scheme

New channel management scheme established over 16km between Feilding and Cheltenham

Ohau-Manakau Scheme

3.9km of stopbanks upgraded

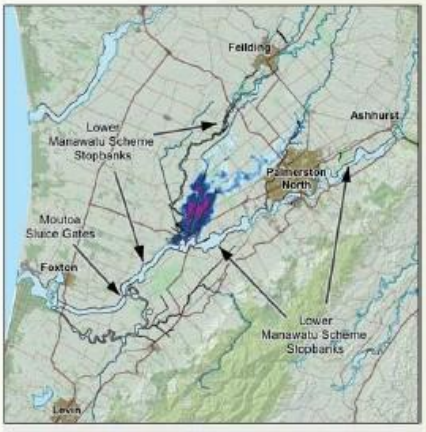
Ashhurst Stream Scheme

2.9km of new stopbanks and flood walls

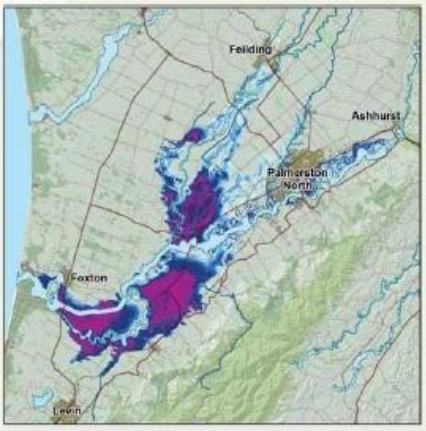

Flood viewing platform at Fitzherbert Bridge

Lower Manawatu Scheme - City Reach

- 8.5km of stopbanks raised by up to 0.9 metres
- Rock linings at Dittmer Drive, Napier Road and Fitzherbert Ave Bridge
- State Highway raised at Napier Road to form flood barrier
- New gated culvert at Napier Road Drain
- 0.6km of flood walls through residential properties in Buick Crescent
- 820m of new stopbanks at Turitea Science Campus
- Various recreational access and river amenity enhancements



FLOOD WITH LOWER MANAWATU SCHEME PROTECTION



FLOOD SPREAD WITHOUT LOWER MANAWATU SCHEME PROTECTION

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2014/626

WHAT'S ON

2014 WATER SYMPOSIUM — Integration: 'The Final Frontier'

NOV 24 - 28 / MARLBOROUGH CONVENTION CENTRE

JOINT CONFERENCE FOR THE
New Zealand Hydrological Society
New Zealand Freshwater Sciences Society
IPENZ Rivers Group

On behalf of the Organizing Committee I have great pleasure in inviting you to join us for the joint Water Symposium of the New Zealand Hydrological Society, New Zealand Freshwater Sciences Society and the IPENZ Rivers Group. The Symposium is to be held at the Marlborough Convention Centre, 24 - 28 November 2014. The theme this year is "Integration: 'The Final Frontier' ~ Whakakotahi te amine rohenga" - integration recognizes the continuity of hydrological processes in space and time.

On behalf of the Scientific Committee I encourage both novice and experienced presenters to submit an abstract for either an oral or poster presentation. The social programme, as always, provides an excellent opportunity for delegates to network with their colleagues and engage with our sponsors.

The Symposium location, Blenheim, is the beating heart of the famous Marlborough wine district. Blenheim's compact town centre makes it easy to explore on foot. Marlborough is an area rich in history and culture, and is home to many artists and artisan craftspeople that draw their inspiration from the region's diverse landscapes. Marlborough also has a deliciously diverse range of wild foods and local produce. These are used by the region's talented chefs to create a tantalizing array of gourmet delights, washed down of course by a glass of your favorite Marlborough wine or locally brewed beer. Delegates will not be disappointed by this welcoming region and renowned convention centre.

We look forward to welcoming you to Blenheim this November.

Conference Chair
Peter Davidson
Marlborough District Council

Please visit us at: http://www.2014watersymposium.co.nz/ and remember abstract submission closes on **22 August 2014**. ≈

CULVERT DESIGN WORKSHOP

The IPENZ Rivers Group is pleased to announce the 2nd iteration of the Culvert Design Workshop, which will take place on campus at University of Canterbury on **October 21st, 2014** from **9:00AM to 4:30PM**.

The workshop will cover progressive design concepts that include new modules on hydraulics, fish passage, and climate change.

The cost of the workshop is **$275** per registrant with registration and payment information soon to follow in an event flyer to all Rivers Group members.

October is fast approaching and with seats limited to 40 its best to be quick and register while there's availability. ≈

flow is the official newsletter of the Rivers Group, is published quarterly, and is distributed to all Rivers Group members.

Limited advertising in subsequent issues may be considered.

We welcome contributions for future newsletters, and particularly appreciate any photographs of rivers that readers are willing to share. Please contact the editor, Mark Pennington, for further information: mark.pennington@pdp.co.nz

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