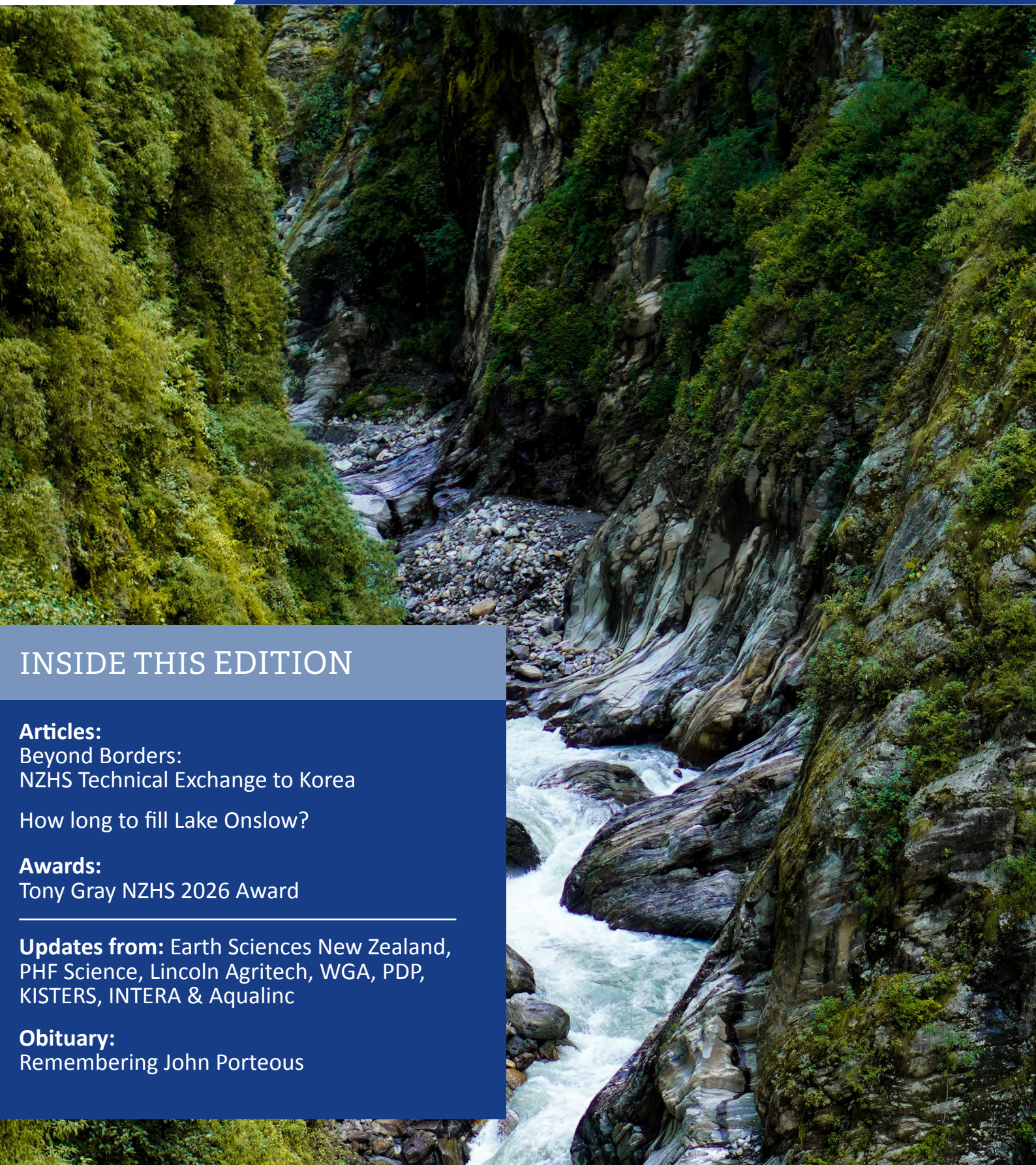
NEW ZEALAND HYDROLOGICAL SOCIETY
E-CURRENT NEWSLETTER



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Georgia Spankie, Greater Wellington Te Pane Matua Taiao

MESSAGE FROM EXECUTIVE

Kia ora,

On behalf of the Executive, welcome to the spring 2026 edition of e-Current. The longer days and sunshine are beginning to creep back in – hope you all have a lovely summer planned as the El Niño kicks in across the motu.

In this issue, you will be able to find Tony Gray's nomination for the Achievement in Operational Hydrology Award. Tony received his award from the NZHS Executive after our annual in-person meeting. This was a very fantastic moment to celebrate Tony and his contribution to hydrology.

As a society, we are proud of our members and want to celebrate you – but we need you to put your fellow members forward for nominations! The awards and eligibility criteria are here.

I would like to highlight in this issue the submission remembering John Porteous. While I didn't know John personally, he leaves a valuable legacy of high-quality hydrological records and observations following a career of more than 40 years – from Kaitaia in the far north to the South Island's West Coast.

The NZHS is proud to be hosting a joint conference with the Rivers Group from on 17–20 November at the Rutherford Hotel in Nelson. This conference marks the 65th anniversary of the NZHS – so it will be a great opportunity to get together to address the theme "Ripple Effects - understanding the impacts of today's decisions in a changing environment," highlights how societal choices affect our water". For more information about the conference, please visit the website.

The NZHS Technical Workshop committee has also locked in a theme for next year's workshop hosted at the Lower Hutt Events Centre on 16–18 March. The theme is "Water Data in Action: Integrating hydrology, water quality and environmental data for managing tomorrow's resources". As a trial, we plan to expand the workshop to include water quality technicians, this is an exciting opportunity to collaborate with our fellow field teams who we work closely with. Please be aware that the workshop Earlybird registrations and abstracts will be closing in December.

Thank you to all our contributors to this e-Current. I hope you enjoy this edition!

Ngā mihi,

Georgia Spankie

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e-Current is the newsletter of the New Zealand Hydrological Society Inc. Contributions are welcome from members at any time and can be sent to admin@hydrologynz.org.nz

Advertising space is available; contact Lea Boodee at the above address for more info.

The views presented in e-Current do not necessarily represent policies of the Society.

AWARDS

It is always great to see members acknowledged for their contributions to the hydrology domain.

Tony Gray was awarded Acheivement in Operational Hydrology Award. The year 2024 marked an impressive milestone for Tony Gray with a celebration of the 50th anniversary of his career in hydrology.

See article on page 8.

On behalf of our members, congratulations and more importantly thank you for your contributions to hydrology in New Zealand.

Please don't forget to provide nominations for these awards and others at any time. Please check the NZHS website for full details on criteria and past recipients.

Mike Ede
NZHS President

NOTICES

New special interest group: Te rōpū Māori

Recognising the particular importance of water to Māori, as well as the unique place te ao Māori has in understanding and managing water, the NZHS is forming a special interest group - te rōpū Māori. The rōpū will firstly be a space for whanaungatanga among those who identify as Māori or who work closely with Māori. It will also be a space to discuss how to elevate te ao Māori within the Society, and how the Society can better meet the needs of Māori both inside and outside the Society.

If you would like to get involved, please get in touch with Daniel Collins (Ngāpuhi) directly or via admin@hydrologynz.org.nz.

Journal of Hydrology (New Zealand)

The Journal of Hydrology (New Zealand) is published twice a year. - www.hydrologynz.org.nz/journal-of-hydrology.

The Journal contains Papers and Notes on all aspects of hydrological science and management. I would especially like to encourage those who presented at the Conference to consider sharing your work with others through publication.

Papers and Notes can be sent to the Editor (admin@hydrologynz.org.nz) at any time. I aim to have papers and notes reviewed in under two months and publish accepted material within a year. 'Notes' are generally short, maybe 4 to 8 pages. Notes are intended to be pilot studies, work that is not completed or technical information (ie interesting and relevant material that is not a final article).

I am also keen to build my pool of potential reviewers, If you are interested please email admin@hydrologynz.org.nz

If you want to discuss your potential publication please don't hesitate to contact me.
Louise Weaver, Editor, Journal of Hydrology (New Zealand)

NZHS Award Nominations

In line with their mission to support and foster hydrology in New Zealand and elsewhere, and to enable NZHS members to receive advanced training in hydrological sciences, NZHS annually presents several student and non-student awards to its members.

A listing of all the awards, nomination criteria and nomination forms can be found on the NZHS website. www.hydrologynz.org.nz/awards

Members are encouraged to think about colleagues who deserve some recognition for their contribution to hydrology and submit nominations.

CONFERENCE

NZHS | Rivers Group Conference 2026



Welcome

On behalf of the organising committee, we invite you to this year's NZ Hydrological Society | NZ Rivers Group Joint Conference in Whakatū | Nelson.

The theme, "Ripple Effects – understanding the impacts of today's decisions in a changing environment," highlights how societal choices affect our water. Through collaboration and knowledge sharing, we can better understand and manage these impacts.

This conference aims to bring our fields together to address current challenges, celebrate achievements, and explore future opportunities. Alongside technical sessions, there will be networking events and a field trip on Friday to the Waimea Dam and its downstream users, including orchards, industry and market gardens.

2026 marks the 65th Anniversary of NZHS. This is the NZHS's third time hosting the conference in Nelson (previously in 1993 and 2012), and the Rivers Group last held their conference here in 2023. There are strong synergies between NZHS and the Rivers Group, and we are pleased to offer another joint conference to strengthen our collaboration.

We look forward to welcoming you in Whakatū | Nelson.

Damian Vellupillai - *Tonkin+Taylor | NZ Rivers Group*
Joseph Thomas - *Tasman District Council | NZ Hydrological Society*
2026 Conference co-chairs

Check out our website for more details at www.nzhsrivers.co.nz

WORKSHOP

NZHS Technical Workshop 2027

Water Data in Action: Integrating hydrology, water quality and environmental data for managing tomorrow's resources

SAVE THE DATE FOR 2027
16-18 MARCH | LOWER HUTT EVENT CENTRE



Welcome

The New Zealand Hydrological Society is excited to invite you to the 2027 Technical Workshop to be held at the Lower Hutt Events Centre, Lower Hutt from March 16th – 18th 2027.

Over three days, attendees will hear from numerous members of the environmental monitoring industry on a range of relevant subjects, as well as participate in either the annual Data Workshop, Gauging Regatta or the newly created Water Quality Regatta.

This workshop provides a unique opportunity for environmental monitoring professionals and industry suppliers to network, learn from each other about their profession, promote products, and share knowledge and experiences with representatives from all over New Zealand. All practitioners with an interest in the profession of environmental monitoring are welcome. We look forward to seeing you in Lower Hutt this coming March.

For more information visit: www.nzhsworkshop.co.nz

AWARDS

Tony Gray NZHS 2026 Award

The year 2024 marked an impressive milestone for Tony Gray with a celebration of the 50th anniversary of his career in hydrology. During that time, there have been substantial changes in hydrological data processing and archiving. Tony has overseen many of these, contributing greatly to the implementation and improvements for the Canterbury Region.
Tony has extensive experience with a wide range of instrumentation and software, supporting the building of a strong hydrological network. He is a thoroughly dependable source of hydrological knowledge for his colleagues, hydrological agencies, and other stakeholders and water users.

Tony commenced work with the Christchurch Hydrological Survey (Ministry of Works & Development) in March 1974 in the data processing team, where he learnt his technical skills and supported the field team. In 1982 Tony moved into the Environmental Data Group and Groundwater Group in the Hydrology Centre (Christchurch) doing data analysis and also varied work for the Groundwater Group. When the Ministry of Works was disestablished in 1988, Tony transferred to Geological & Nuclear Sciences where he continued this work.

In the early 1990s, Tony began working for Environment Canterbury (at Christchurch office in Kilmore St) as a Senior Hydrological Analyst, and from 2007 to 2024 he held the role of Hydrological Archives Team Leader, managing a team of four staff. Tony's attention to detail, and his significant experience in data processing, analysis, quality assurance, and data management, has enhanced the quality of data in the Environment Canterbury hydrological archive and the data contributed to the National Hydrometric Database.

Tony has developed procedures for office practice, audited sites, provided helpful feedback, shared his expertise, and trained colleagues. He has been the liaison person with many agencies, and he is the Environment Canterbury Christchurch office's informal "helpdesk" for Hydstra software issues within the Science group. Replying to data requests are a major part of Tony's role (which he enjoys) and he is renowned for his prompt and helpful responses. Tony has been a dependable mainstay of Environment Canterbury's buddy system, contributing to the safety of the field technicians. For over 20 years he has been one of the four on-call Hydrological Flood Duty Officers (Northern area) who monitor sites and provide advice to the Flood Controller in this extremely important role.

Tony's contribution to Canterbury's, and consequently New Zealand's, quality hydrological data has been invaluable, and we thank him for his many years of thoughtful care.



Back Row: Tim Davie, Suzanne Gabites, Graeme Horrell
Front Row: Esther Smith, Tony Gray, Trish Lockington, Mandy Chater
Photo credit: Trish Lockington



Photo credit: Trish Lockington



Photo credit: Trish Lockington

ARTICLE

Beyond Borders:
NZHS Technical Exchange to Korea

By Angie Perks

Introduction

In May 2026, a delegation from the New Zealand Hydrological Society (NZHS) travelled to the Republic of Korea to strengthen international relationships, exchange knowledge, and explore developments in hydrological science and practice. The visit provided a valuable opportunity to engage with Korean colleagues working across the water sector and to gain insights into approaches, technologies, and operational practices that address many of the same challenges faced here in New Zealand.

The visit was facilitated by two Memoranda of Understanding, one signed with the Korea Water Resources Association (KWRA) in February 2007 to support scientific collaboration, and another with the Korea Institute of Hydrological Sciences (KIHS) in March 2026 to promote the sharing of hydrological and environmental data and identify opportunities for joint research.

The NZHS delegation included **Kristy Martin** (Earth Sciences New Zealand), **Angela Perks** (Bay of Plenty Regional Council), **Nick Oliver** (Auckland Council), **Shontelle Milne** (Environment Canterbury), and **Mike Ede** (Tasman District Council and NZHS President). Together, the group represented a broad range of expertise, including hydrological monitoring, field operations, data management, water resources science, and organisational leadership. This diversity enabled rich technical discussions and facilitated knowledge sharing across a wide range of disciplines.

Visit to the Korea Institute of Hydrological Survey

The primary component of the visit was a six-day programme hosted by KIHS. The programme included visits to KIHS headquarters in Ilsan, a technical seminar session (including presentations and discussions), the Andong River Experiment Centre, and a number of field monitoring sites and operational facilities.

These visits provided an in-depth view of Korea's hydrological monitoring network, field methodologies, and research capabilities. Delegates observed a range of technologies and operational practices used to collect, manage, and analyse hydrological data. Particular interest was generated by Korea's investment in dedicated testing, research, and training facilities, which support both innovation and capability development across the sector.

Site visits and technical discussions offered valuable opportunities to compare approaches, share experiences, and examine common challenges associated with hydrological monitoring, data quality, operational efficiency, and emerging technologies. Observing these facilities and practices firsthand helped identify ideas and perspectives that may have relevance for hydrological practice in New Zealand.



NZHS & KIHS Technical Exchange Discussion Session for Water Resources Experts. Credit: Angela Perks (BOPRC)



NZHS & KIHS Gauging Regatta, including a visit to a continuous monitoring site on a tributary to the Nakdong River, where delegates got to test drive the KIHS Buddy remote controlled ADCP boat. Credit: KIHS

Korea Water Resources Association Conference

The delegation also attended and gave individual oral presentations at the Korea Water Resources Association (KWRA) Conference in Busan, which brought together national and international professionals from across academia, government, industry, and the wider water sector.

Conference presentations and discussions addressed many topics familiar to NZHS members, including water resources management, hydrological modelling, flood risk management, drought resilience, sediment processes, water quality, and the growing application of digital technologies and remote sensing. The event provided a valuable platform for learning about current research and emerging trends while also fostering connections with water professionals from across Korea.

Participation in the conference highlighted the shared challenges facing water managers internationally and reinforced the importance of collaboration and knowledge exchange in advancing hydrological science and practice.



International delegates who attended and presented at the Korea Water Resources Association (KWRA) Conference 2026. Credit: KWRA

Cultural experience and hospitality

In addition to the technical programme, the visit provided an opportunity to experience Korean culture, history, and daily life. Exploring local communities, experiencing Korean cuisine, and engaging with people outside formal professional settings enriched the overall experience and provided valuable cultural context.

A defining feature of the visit was the exceptional hospitality extended by our hosts. Throughout the programme, colleagues from KIHS and KWRA were generous with their time, knowledge, and expertise. The openness with which they shared their experiences and welcomed discussion created an environment that encouraged genuine collaboration and professional exchange.
The delegation returned with not only a deeper appreciation of Korea's hydrological capabilities but also a strong sense of gratitude for the warmth and kindness shown by everyone involved.



Delegates visiting a replica of the world's first standardised rain gauge. Invented in 1441, this rain gauge was used to create a nationwide weather monitoring network of approximately 350 stations in 1442. Credit: KIHS

Key outcomes and reflections

This visit marked an important step in strengthening relationships between NZHS and the Korean hydrological community. It provided valuable opportunities to build new professional connections, exchange technical knowledge, and identify areas of mutual interest for future collaboration.

Delegates returned to New Zealand with fresh insights into hydrological monitoring, data stewardship, field operations, workforce development, and the role of dedicated research and training facilities. The experience also highlighted the value of international engagement in driving continuous improvement and innovation within New Zealand's hydrological sector.

Beyond the technical learnings, the visit reinforced the importance of strong professional networks and ongoing dialogue with international colleagues facing similar water management challenges. Delegates shared their experiences with their respective teams, generating significant interest and discussion. Questions focused on automation strategies, operational processes, training, monitoring site design, and particularly the KIHS Buddy ADCP vessel and the widespread use of STIV methods in field operations.

To maintain and build on these relationships, a new project group has been established, with New Zealand representatives **Mike Ede, Angela Perks, Kristy Martin**, and **Georgia Spankie**. The group's first joint meeting is scheduled for September 2026 and will focus on strengthening partnerships, maintaining professional networks, and exploring potential collaborative research opportunities.

Acknowledgements

The NZHS extends its sincere appreciation to the KIHS and the KWRA for their generous hospitality and the significant effort invested in hosting the delegation. Their willingness to share knowledge, showcase their work, and facilitate meaningful exchanges made the visit both professionally enriching and personally memorable for all delegates.

We look forward to maintaining these connections and exploring future opportunities for collaboration and mutual learning between the hydrological communities of New Zealand and Korea.

ARTICLE

How long to fill Lake Onslow?

By Earl Bardsley

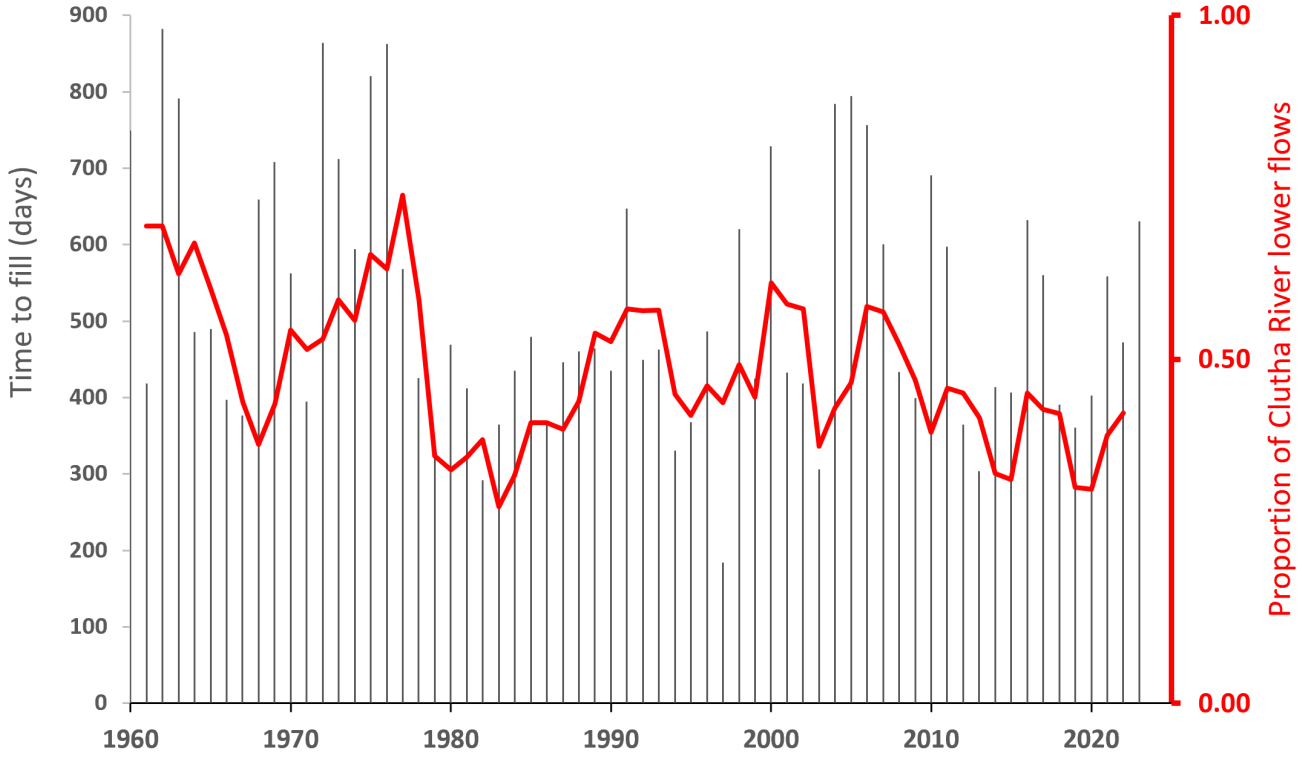
The Lake Onslow pumped storage scheme in Central Otago is presently in the Fast-track consenting process and has recently gained some initial backing from well-known New Zealand investors. The private consortium seeking to build the scheme see it as an eventual replacement for the aging Huntly power station.

A key feature of the scheme is pumping more than 3 cubic kilometres of Clutha River water up into an expanded Lake Onslow, which serves as the upper reservoir. The scheme is open loop, with the Clutha River being the lower reservoir. The connection point to the river is presently specified as being near Craig Hill, about 50 kilometres downriver from the Roxburgh Dam.

From time to time, concerns are expressed as to whether the Clutha River can provide sufficient water to allow the initial fill of the scheme to be achieved in reasonable time. Part of this fill includes a volume component of dead storage water below the minimum operating level of the upper reservoir.

To clarify the fill-time issue, the figure presented here shows fill times from simulated Clutha River pumping for different starting times over a past record of daily river flow. The upper reservoir being "full" is defined as pumping from the Clutha River resulting in the Onslow water level rising to reach 760 metres asl, taken to be the normal operating mean lake level outside of dry years. This level is a little below the currently specified upper operating limit of 769 metres.

The simulations have a maximum pumping rate of 200 cubic metres per second. Pumping was constrained by not reducing the Clutha River flow to less than 250 cubic metres per second, which is also the minimum required water release rate from the Roxburgh Dam.



Upper reservoir first-fill times and Clutha River low-flow characteristics

The vertical bars show the times to fill, starting in each case from November 1 of every year from 1960 to 2023. The red line is a 3-year running mean of the proportion of time in each year that the Clutha flow is less than 250 cubic metres per second. The longest time to fill is 316 days, for the fill starting from November 1, 1970. Most fill times are less than 200 days. Though not so evident on this scale, the fill time variability reflects the number of days when the 250 cubic metres per second river flow constraint reduces or prevents pumping.

The relatively short fill times means that water availability for the first fill is not a factor that threatens the viability of the Lake Onslow pumped storage scheme.

Actual first-fill times may be somewhat longer than suggested here, however, for commercial and technical reasons rather than hydrological. During the fill process there may be times of high power prices, making it economical to run some water back and generate power for income instead of pumping. That is, the fill process may be more like a rising saw-tooth than a uniform water level rise. The technical aspect is that filling large reservoirs for the first time often involve still-stands for varying periods to check on any local seismic response to the increasing water load.

UPDATE

Earth Sciences New Zealand

Compiled by Rasool Porhemmat and Tusar Sahoo

Earth Sciences New Zealand takes a major step toward open-source hydrological modelling

Earth Sciences New Zealand is preparing for a major shift in how it delivers hydrological modelling and water-resource analysis for Aotearoa New Zealand and the Pacific. The organisation is moving from its current in-house, closed-source modelling system toward Wflow, an open-source, distributed hydrological modelling framework.

The decision followed an assessment of 22 hydrological models, with around 20 staff contributing expertise across science, operations and technology. Wflow ranked first because it is well suited to steep catchments, variable rainfall, snow and groundwater processes, and connected river systems. Its gridded structure also supports modelling in both data-rich and data-scarce environments.

This transition marks an important investment in reproducible science, transparency and collaboration. Wflow's open-source design will allow stronger scientific scrutiny, shared development and closer links with national and international partners. Implementation will be staged over the coming years, allowing existing services to continue while new workflows, training and partnerships are developed. For more information, contact Channa Rajanayaka.

Five years of collaboration strengthen Westport flood forecasting and preparedness

A final workshop in Greymouth and Westport has marked the completion of the five-year Westport Flood Warning Project. The project brought together Earth Sciences New Zealand researchers, West Coast Regional Council, Buller District Council, emergency managers and community representatives to develop and operationalise an end-to-end flood forecasting system for Westport.

The work began shortly before the severe July 2021 flood and evolved through subsequent events, including the February 2022 floods. This created an unusual opportunity to develop and test forecast information alongside real emergency responses. The concluding workshop reviewed the operational system, the experience gained during those events, and the ways forecast-uncertainty is interpreted in high-pressure decisions.

The team also presented research developments that extended the original project. These included NZENS extended-lead ensemble forecasting, real-time machine-learning-based inundation mapping, and social science research into how people understand and use forecast information. Together, these components connect weather and river predictions with likely impacts and the needs of decision-makers.

Around 25–30 people attended the workshop across the two days. A major outcome was not simply the delivery of new tools, but stronger relationships and a shared understanding among scientists, forecasters, councils, emergency managers, controllers and the community. The project demonstrates that effective flood warning depends on both technical capability and sustained collaboration. Its legacy is an operational forecasting system, a body of applied research and a more connected network supporting Westport's preparedness for future floods. For more information, contact Céline Cattoën-Gilbert.

Climate change compounds pressure on water allocation in Marlborough

Climate change is expected to alter both water availability and water demand across Aotearoa New Zealand, placing growing pressure on allocation systems designed around historical conditions. Earth Sciences New Zealand researchers have developed a modelling workflow that brings these two sides of the water balance together, allowing climate-driven changes in river supply and irrigation demand to be assessed consistently.

The workflow combines projections from multiple global climate models and shared socioeconomic pathways with information on crop type. When applied to the Wairau Plains in Marlborough, it indicated increasing irrigation demand for vineyards and orchards alongside declining river flows and reduced reliability of supply. These changes could intensify competition for water during dry periods and increase the frequency or duration of restrictions.

Most of the climate models agreed on the direction of change, but the projected magnitude varied substantially. This uncertainty is important for decision-making: planning must account not only for the most likely outcome, but also for the range of plausible pressures on rivers, users and freshwater ecosystems.

By linking future water demand with changes in hydrological supply, the workflow provides a practical basis for testing whether existing allocation approaches remain robust. It can also support the development of adaptive strategies that respond as climate signals become clearer. The Wairau Plains application demonstrates the value of integrated modelling for identifying where and when water-management pressures may emerge, while explicitly retaining the uncertainty needed for risk-informed planning. For more information, contact **Rachel Smith.**

Connecting storms, climate drivers and river floods across Northland

Flood impacts in the Northland region vary markedly from one event to another. The outcome depends not only on rainfall totals, but also on storm structure, catchment response and antecedent conditions. To examine these connections systematically, Earth Sciences New Zealand researchers developed an integrated framework linking storm characteristics and large-scale climate drivers with river responses across 65 long-term monitoring sites.

The analysis identified two dominant flood-response types. Some events developed rapidly and produced sharp river peaks, while others generated slower, prolonged flooding under sustained rainfall. The most widespread and damaging floods were commonly associated with persistent moisture-bearing weather systems, particularly during winter. Large-scale climate variability, including El Niño and the Southern Annular Mode, also influenced the likelihood and character of flooding.

This regional perspective moves beyond studying individual storms or catchments in isolation. By considering how atmospheric forcing and hydrological response vary together across many sites, it becomes possible to identify the combinations of conditions most likely to produce rapid, prolonged or spatially extensive flooding.

The findings provide an evidence base for improving flood-risk management in Northland. They can inform earlier and more reliable warnings, help tailor monitoring and forecasting to different flood types, and support infrastructure and land-use planning that accounts for regional climate influences. The framework also offers a transferable approach for understanding why storms with apparently similar rainfall can generate very different river and community impacts. For more information, contact **Shailesh Singh.**

Mapping Canterbury's braidplains to support river and land-use planning

Canterbury's braided rivers are dynamic systems that can shift across wide areas over time. Their active channels may occupy only part of the landform shaped by past river movement, creating challenges for flood-risk management, infrastructure investment and decisions about future development. Environment Canterbury commissioned Earth Sciences New Zealand to map the natural topographic extent of braided-river systems across the region.

The work first drew on historical maps and aerial imagery to identify where active river channels have previously occurred. These historical braidplain margins were then extended to natural topographic steps and other confining features visible in high-resolution LiDAR-derived elevation data. The resulting topographic braidplain margins provide a geomorphically informed representation of the space within which each river has developed and moved.

Earth Sciences New Zealand also updated Canterbury's Braided River Overlay. Within flood-protection scheme areas, the overlay incorporates river-management boundaries associated with features such as stopbanks and vegetation planting. Outside these managed areas, it uses the newly mapped topographic braidplain margins.

The datasets give Environment Canterbury a stronger and more consistent evidence base for understanding river behaviour and long-term flood exposure. They can support river management, flood protection, infrastructure planning and assessments of where land-use intensification may conflict with natural river processes. The updated overlay is also expected to inform development of Canterbury's Regional Spatial Plan under emerging planning legislation. More broadly, the work illustrates how historical evidence and modern elevation data can be combined to make the long-term footprint of dynamic rivers visible in present-day planning. For more information, contact Jo Hoyle.

AIA Programme concludes with 12 regional water projects delivered

The Aqua Intel Aotearoa (AIA) Programme successfully concluded last year, having delivered 12 major water availability projects across Northland, Gisborne, Southland and Otago. AIA was a collaborative partnership between Kānoa, the delivery arm of the Provincial Growth Fund, and Earth Sciences New Zealand (formerly GNS Science). The programme significantly advanced regional understanding of water resources through a range of integrated investigations and technical studies. Key achievements included the collection, processing, interpretation, and re-interpretation of airborne electromagnetic (AEM) data, development of approaches for harvesting high river flows, surface water monitoring and gauging, groundwater drilling, and comprehensive hydrological and groundwater modelling.

These projects have strengthened knowledge of groundwater and surface water systems, improved understanding of water allocation pressures, and identified opportunities for both natural and engineered water storage solutions. Collectively, the programme has provided valuable information to support regional productivity, water security, and resilience in the face of future environmental and climate challenges. For more information, visit AquaIntel or contact Stewart Cameron.

New understanding of denitrification provided by our new technique: excess-nitrogen

Groundwater in the Heretaunga Plains commonly displays mixed redox signatures, reflecting the

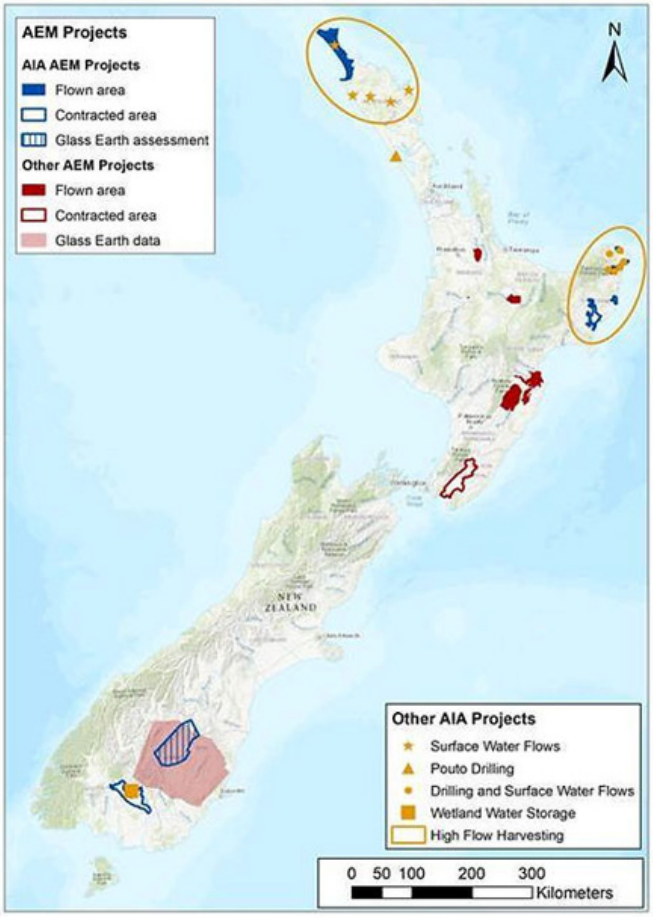


Figure 1: Location of AIA projects in Northland, Gisborne, Otago and Southland.

blending of waters with different flow paths and redox histories within wells. By combining new excess-nitrogen data with groundwater age information and the existing conceptual model of the aquifer system, it was possible to identify where denitrification occurs and the factors controlling it. This provides a stronger basis for predicting nitrate fate and informing groundwater management under changing land use and climate conditions. Although measured nitrate concentrations are generally low, reconstructed initial nitrate concentrations indicate that groundwater recharge in the southern Heretaunga Plains can contain up to 9 mg/L NO_3-N. Much of this nitrate is naturally attenuated through denitrification. In Hastings City supply wells, denitrification has removed 30-46% of the initial nitrate load, demonstrating the importance of natural attenuation processes. However, complete removal of a high nitrate load was observed only in one confined, highly anoxic groundwater setting. Elsewhere, denitrification removed only up to 30% of similar loads, indicating limited capacity and dependence on specific hydrogeochemical conditions.

Overall, the aquifer has limited ability to remove additional nitrate. Consequently, increased nitrate

inputs are likely to produce proportional increases in groundwater nitrate concentrations, while reduced recharge may further exacerbate groundwater quality risks. For more information, contact Uwe Morgenstern.

National-scale MODFLOW-API model for predicting groundwater drought

The coincidence of surface and groundwater drought can strongly influence a region's ability to recover from prolonged dry conditions. Within the Future Proofing Groundwater Endeavour Programme (FPGW), we aim to simulate the interaction of surface and subsurface drought processes to improve predictions of the hydrological manifestations, spatial extent, timing, and duration of drought. These characteristics are ultimately governed by the integrated hydrological system and the complex interactions between groundwater and surface water.

A key achievement of this work has been the development of a national-scale groundwater model for Aotearoa New Zealand, coupled with a simplified groundwater recharge model using the MODFLOW API. The recharge model uses precipitation and potential evapotranspiration, readily available from climate models. The recharge model is directly coupled to the MODFLOW model to ensure strict mass balance and feedback between the groundwater and surface, including groundwater discharge and groundwater supplementation of soil moisture. Future climate model projections are then used with the model to predict the extent, severity, and associated uncertainty of groundwater drought across New Zealand. This work provides critical insights into how drought intensity and duration may evolve under a changing climate, the potential economic consequences of these changes, and the adaptation strategies needed to enhance resilience to future biophysical and economic impacts. For further information, please contact Catherine Moore or Wes Kitlasten.

Rethinking groundwater monitoring across New Zealand

A multi-year joint review of Waikato's groundwater quality monitoring programme has now been completed, addressing recognised shortcomings in Aotearoa New Zealand's environmental monitoring networks and improving our ability to evaluate the effectiveness of freshwater policies. The review was undertaken through extensive consultation with the Groundwater Forum Special Interest Group to ensure a nationally consistent approach. The work was also complemented by the parallel development of a national framework with support from the Groundwater Forum, Earth Sciences New Zealand and the Ministry for the Environment. This framework separates monitoring into Surveillance (long-term trends) and Evaluative (management effectiveness) programmes and aims to replace the current state of the environment monitoring programmes. The Waikato review became the first practical application of these principles and the GIS-based index-overlay approach that was developed to review and prioritise monitoring.

Key outcomes include proposed regional and national Surveillance groundwater quality monitoring programmes with improved representativeness and efficiency, along with case studies demonstrating how Evaluative monitoring can be applied. The review report also highlights the need for broader engagement among policymakers, scientists, and communities when defining evaluation objectives. Importantly, the report provides unprecedented transparency regarding the trade-offs between monitoring objectives, practical constraints, and available resources, while offering recommendations to future-proof groundwater quality monitoring across New Zealand. For further information, please contact Magali Moreau.

Stuffy bedrooms may be affecting sleep and indoor air quality

A recent study published in the *New Zealand Medical Journal* has highlighted a hidden issue in many New Zealand homes: carbon dioxide (CO_2) levels can build up significantly overnight in occupied bedrooms, indicating inadequate ventilation and potentially affecting both health and wellbeing.
The research, *Stuffy nights: elevated bedroom carbon dioxide concentrations indicate inadequate ventilation in Wellington homes,* found that CO_2 generated by normal breathing can accumulate to elevated levels while occupants sleep. High indoor CO_2 concentrations are widely recognised as indicators of poor ventilation and may contribute to poorer sleep quality, reduced next-day cognitive performance, and the accumulation of indoor pollutants and airborne biological contaminants, including respiratory pathogens.

Earth Sciences New Zealand researchers Perry Davy and Bill Trompetter contributed to this study through

their involvement in a BRANZ-funded investigation of indoor pollution sources. The findings attracted considerable public interest and received national media coverage, including on Radio New Zealand (https://www.rnz.co.nz/life/lifestyle/home/stuffy-wellington-homes-affecting-sleep-and-mould-levels), highlighting the importance of adequate bedroom ventilation in maintaining healthy homes. For further information, please contact **Perry Davy.**

New tool identifies historical landfill contamination in drinking water aquifers

Historical landfills established before modern environmental regulations continue to pose risks to groundwater resources around the world. Many older landfills were constructed without protective liners, often within recharge zones of drinking water aquifers. Until recently, tracing their impacts on groundwater and drinking water supplies has been extremely difficult. Researchers at Earth Sciences New Zealand have developed a promising new approach using chlorofluorocarbons (CFCs) as highly sensitive tracers of landfill leachate in groundwater. Because many discarded materials in historical landfills contain CFCs, these compounds can be detected at extremely low concentrations and used to identify groundwater influenced by landfill-derived contaminants.

Initial investigations indicate that approximately 2-4% of community drinking water wells may be affected by landfill leachate. The new methodology provides regulators with a practical and cost-effective way to identify vulnerable wells and assess potential risks to drinking water supplies. The research is now progressing to publication in an international journal and is expected to attract considerable international interest. Beyond New Zealand, the method has the potential to be applied globally wherever historical landfills pose risks to groundwater resources. For further information, please contact **Uwe Morgenstern.**

UPDATE

PHF Science

Update from PHF Science's Groundwater and Environmental Microbial Solutions and Circular Economy Team

Compiled by Laura Banasiak

The Groundwater and Environmental Microbial Solutions teams provide specialist scientific services and research focused on protecting drinking water sources, groundwater resources, and public health. The teams undertake groundwater quality monitoring, contaminant surveillance, hydrogeological investigations, pathogen fate and transport studies, wastewater impact assessments, groundwater ecosystem research, climate change resilience projects, and environmental risk assessments. Our work spans field investigations, laboratory analysis, data science, modelling, and decision-support tool development, supporting government agencies, regional councils, utilities, industry, and international partners. Current research includes emerging contaminants, per-and polyfluoroalkyl substances (PFAS), microplastics, nitrate mitigation and source tracking, pathogen transport in aquifers, climate change impacts on groundwater safety, groundwater ecosystem health, human wastewater management, and water security in New Zealand and the Pacific. The teams also maintain specialist groundwater field sites and long-term datasets that underpin nationally significant research and environmental monitoring programmes, as well as utilising artificial intelligence (AI) to enhance our data analysis techniques. Our ability to continue to fund the continuation of these sites and datasets is limited, so we welcome interest in co-funding or using these sites for future investigations. For further information, contact: Laura.Banasiak@phfscience.nz and Louise.Weaver@phfscience.nz

Using AI to optimise groundwater monitoring networks

Groundwater monitoring programmes are essential for identifying contamination risks and protecting drinking water supplies, but maintaining large monitoring networks can be costly and resource-intensive. To address this challenge, PHF Science initiated a Pioneer-funded project examining how AI can be used to optimise groundwater monitoring networks while maintaining their ability to detect contaminants. Led by the Groundwater team, the project has developed a proof-of-concept framework using data from the national groundwater pesticide surveys. Machine learning models were used to identify contamination patterns, predict concentrations at unsampled locations, and generate spatial risk maps across aquifers. These outputs were combined with optimisation algorithms to identify the most efficient monitoring networks, balancing contaminant detection capability, spatial coverage, and sampling costs.

Initial results demonstrate that AI-assisted optimisation can substantially reduce the number of monitoring sites required while retaining most of the network's ability to identify contamination hotspots and emerging risks. Although pesticides are being used as the pilot case study, the approach has broader applications for monitoring emerging organic contaminants (EOCs), PFAS, wastewater impacts, and other environmental hazards. The project is helping build PHF Science's capability in AI-enabled environmental surveillance and lays the foundation for smarter, more cost-effective monitoring strategies that can support public health protection and environmental management into the future.

An abstract describing the project and its methodology has been submitted to the 2026 New Zealand Hydrological Society and Rivers Group Joint Conference in Nelson, where the team hopes to share the findings with regional and district councils, researchers, regulators, and water sector practitioners.

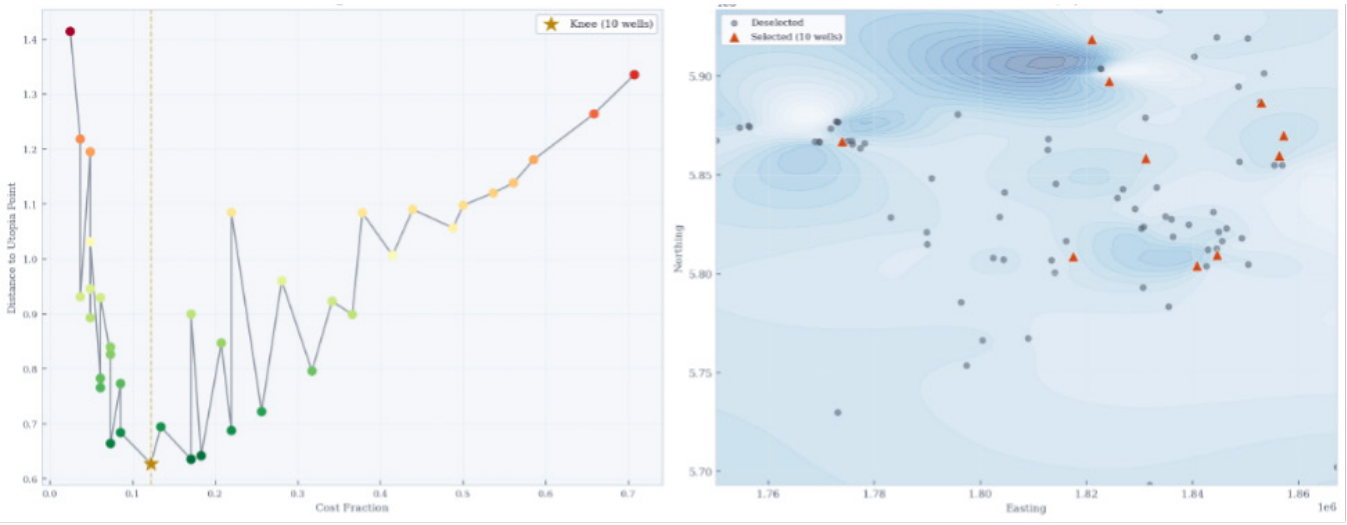


Figure 1: Pareto knee point optimal solution with recommended network.

Strengthening wastewater infrastructure to reduce public health risks

New Zealand's wastewater systems, both large municipal treatment plants and small onsite systems, are ageing and increasingly stressed by extreme weather events. Wastewater infrastructure is a critical barrier protecting both public health and receiving waters from pathogens and chemical contaminants. Evidence linking infrastructure performance to public health incidents in New Zealand is limited, with problems often only identified after major infrastructure failures, which is constraining risk-based decision-making under the Water Services Authority - Taumata Arowai new wastewater standards. A three-year Strategic Science Investment Fund (SSIF) project is currently in its first year of staged deliverables to assess and prioritise risks from wastewater systems and their discharges to land, freshwater, and coastal environments. The project is also working alongside two councils (Western Bay of Plenty District Council and Waimakariri District Council) to characterise their wastewater at a specific municipal treatment plant and explore interventions that would enhance their wastewater treatment performance and discharge to the receiving environment to reduce public health risks.



Figure 2: Wastewater management from left to right: treatment to discharge to the receiving environment.

Estimating rainwater tanks with AI: a drinking water infrastructure asset and emergency planning tool

Due to climate change and the threat of natural disasters, some households in New Zealand are becoming increasingly reliant on roof rainwater collection as their primary drinking water source. This is particularly evident in parts of the country where alternative drinking water sources such as groundwater or surface waters are not an option either due to water quality or quantity issues, such as Northland, outer Auckland, Waiheke, Kapiti Coast and Banks Peninsula. Rainwater collection as an unreticulated drinking water source can carry a burden of disease such as gastrointestinal illness that is typically underreported and unregulated. Rainwater tanks, however, can provide a valuable alternative water source for dwellings during an emergency or natural disaster.

For many regions throughout New Zealand, asset information regarding privately owned rainwater tanks is not available. PHF Science initiated a Pioneer-funded project to examine how AI can be used to map rainwater tanks by training an object detection model using high-resolution (30 cm) aerial imagery (LINZ national aerial imagery programme, 2023). The object detection model was developed using the Detection2 deep learning framework. The rainwater tanks that were detected represent model predictions, with detection accuracy depending on image quality, tank size, surrounding vegetation, shadows, roof materials, and other landscape features. Field verification or additional data sources are recommended for applications requiring high accuracy, but this work represents a first trial of training an object detection model using high-resolution aerial imagery for asset location estimation to assist with drinking water emergency and climate change planning and response.



Figure 3: Object detection model using high-resolution aerial imagery for the location estimation of rainwater tanks.

Recent publications and outputs

Ameen A, Mikuni-Mester PJ, Bromberger B, Kirschner AK, Sommer R, Blaschke AP, Pang L, Stevenson ME. 2026. Microplastics as vectors for virus transport in saturated quartz sand: Reduced PRD1 bacteriophage infectivity and enhanced mobility. Journal of Hazardous Materials. 2026 Jun 1:142569.

Dost, K., Muraoka, K., Ausseil, A.-G., Benavidez, R., Blue, B., Conland, N., Daughney, C., Semadeni-Davies, A., Hoang, L., Hooper, A., Kpodonu, T. A., Marapara, T., McDowell, R., Nguyen, T., Nguyet, D. A., Norton, N., Özkundakci, D., Pearson, L., Rolinson, J., … Wicker, J. (2026). Freshwater modeling in Aotearoa New Zealand: Current practice and future directions. Environmental Modelling & Software, 197, 106820. https://doi.org/10.1016/j.envsoft.2025.106820

Pang, L., Sadler, A., Bell, M., Harris, S., McGill, E., Sutton, R., Rowland, G., Staiger, M.P. 2026. Chitosan-based antimicrobial filter media for point-of-use water treatment: a proof-of-concept study. Environmental Science and Pollution Research, 33: 12935-12945. https://doi.org/10.1007/s11356-026-38103-1

Pearson, A.R., Kenny, A., Abraham, P., Qiu, R., Sutton, R., Close, M.E., Sarris, T.S. 2026. Projected expansion of potential seawater intrusion into coastal aquifers of Aotearoa New Zealand to 2150. Communications Earth & Environment, https://doi.org/10.1038/s43247-026-03664-z

Pölz A, Blaschke AP, Demeter K, Blöschl G, Stevenson ME, Bauer H, Pang L, Mayer R, Farnleitner AH, Derx J. 2026. AI modeling for spring management: Prediction of karst spring discharge and water quality using interpretable machine learning models. Austrian Water and Waste Management. 2026 Apr 20:1-5.

Sarris, T. (2026). Environmental geotechnology in a changing climate: challenges and opportunities. Environmental Geotechnics, 13(1), 1-3.

Stevenson ME, Pang L, Farnleitner AH, Lindner G, Reiter M, Kirschner AK, Blaschke AP, Sommer R. 2026. Evaluation of surrogates for validating the retention capacity of Cryptosporidium oocysts during drinking water treatment by sand filtration. Austrian Water and Waste Management. 2026 Apr 20:1-9.

UPDATE

Lincoln Agritech

Compiled by Juliet Clague

KiwiNet's Emerging Innovator Programme

Patrick Durney has been selected for KiwiNet's Emerging Innovator Programme, joining six other researchers from across Aotearoa. Patrick is exploring commercial opportunities for combining AI modelling and fast physical simulation to provide rapid flood predictions. Congratulations Patrick, and all the very best for this innovative programme.

DarcyWarp

Repeated steady-state groundwater solves for calibration and uncertainty analysis are often limited by runtime. **Patrick Durney** and **Jaco Fourie** have recently developed DarcyWarp, a graphics processing unit (GPU)-accelerated geometric multigrid solver for two-dimensional, steady-state, single-layer groundwater flow using a fixed-transmissivity formulation on structured grids.

DarcyWarp implements an explicit cell-integrated five-point finite-difference operator and multigrid cycle as Python kernels compiled for GPU execution with NVIDIA Warp. The solution supports areal source/sink terms, prescribed head, no-flow, and general-head boundaries. Validation against a sparse finite-difference direct solve and MODFLOW 6 on matched grids showed close head agreement, consistent residuals, and mass-balance closure. DarcyWarp reached about 70 times end-to-end speedup over MODFLOW 6 in a single-instance suite and order-of-magnitude throughput gains in ensembles, enabling reproducible repeated-solve workflows on readily available GPUs. For more detail, see their paper:

Durney, P and Fourie, J., 2026. DarcyWarp: A graphics processing unit (GPU)-accelerated multigrid solver for repeated 2D fixed-transmissivity groundwater solves validated against reference solvers, Environmental Modelling & Software, 204,107081 https://doi.org/10.1016/j.envsoft.2026.107081.

Safeguarding Te Mana o Te Awa o Waikato from Emerging Climatic Pressures

We continue to gather data for the MBIE-funded research programme Safeguarding Te Mana o Te Awa o Waikato from Emerging Climatic Pressures, with the team making the most of the winter sunshine by sampling up and down the river (Figure 1).

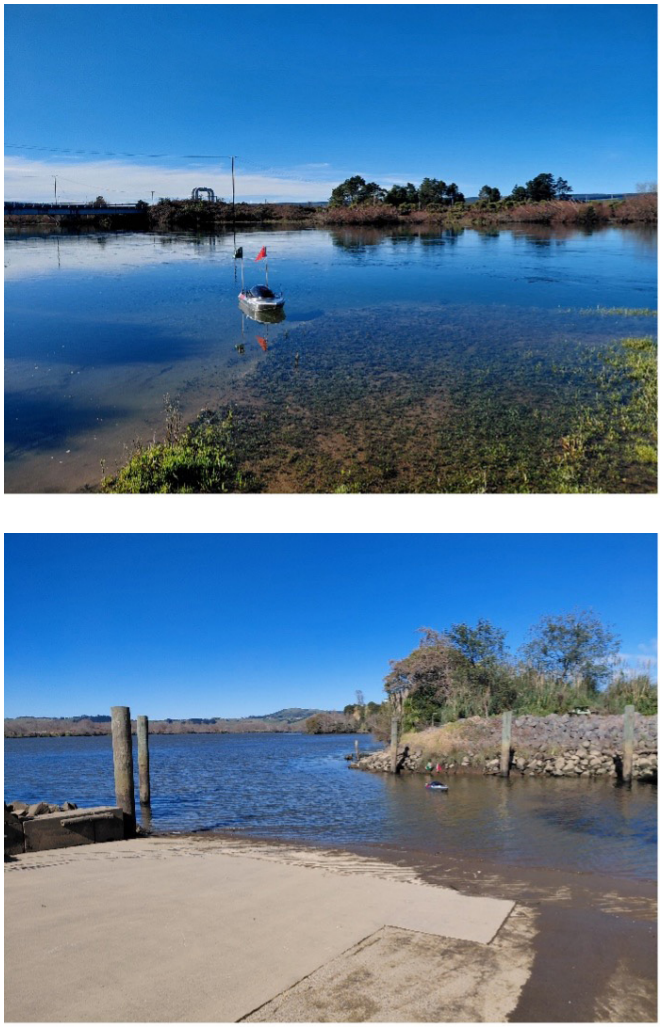


Figure 1: Using our ¼-scale jet boat for sampling transects of the Waikato River near Ohaaki power station (left) and at The Elbow near Tuakau (right)

Serendipitously, the research project started in time to observe the impacts of the invasion of *Corbicula fluminea* in the Waikato River, which is driving rapid, measurable changes in source water chemistry and has direct implications for downstream water treatment. Filter-feeding by dense clam populations depletes calcium, episodically mobilising reduced arsenic, and contributes to a metabolic regime shift in the river. Combined with elevated geothermal and biological CO_2 loads, these compound pressures are reshaping the raw water that suppliers draw from the Waikato.

A paper on this subject has been recently published in Environmental Science & Technology, focused on the effect the rapid establishment of the invasive clam *Corbicula fluminea* has had on the chemistry of the river and the flow-on effect for drinking-water security:

Hartland, A. et al. (2026) Carbonate-system perturbation by invasive bivalves threatens drinking-water security in calcium-limited catchments. *Environmental Science & Technology*. https://doi.org/10.1021/acs.est.6c03421

Adam Hartland and **Ivan Ottenheijm** (Lutra Water) also provided a webinar in July on this challenge. This webinar brought Lincoln Agritech's research findings together with operational perspectives from Lutra and Watercare on what these changes mean for source water monitoring, treatment process design, and risk planning. It covered:

- the biogeochemical mechanisms driving water quality change in the Waikato;
- what suppliers should be watching for in raw water trends; and
- operational and monitoring responses already underway.

If you missed this illuminating webinar, find it here: Invasive Clams and the Waikato: Emerging Risks for source water and treatment: Water New Zealand

UPDATE

WGA

Compiled by Cameron Jasper

WGA+LDE AtkinsRéalis Companies

Wallbridge Gilbert Aztec (WGA) acquired LDE Ltd in late 2025, bringing LDE's New Zealand regional practice in geological, geotechnical, civil, structural, coastal and environmental engineering together with WGA's multidisciplinary engineering, science and hydrogeology capability. LDE was founded in Tairāwhiti Gisborne, and WGA has operated in Aotearoa New Zealand since 2017. The combined WGA+LDE team now works from offices across the North Island and in Christchurch.

On 24 September 2026, WGA became part of AtkinsRéalis, a global engineering, design and project management company headquartered in Montreal, Canada, with approximately 40,000 people worldwide. Clients will continue to work with the same WGA and LDE people, with access to AtkinsRéalis' broader specialist capability across water, environment and infrastructure when projects require it.

New hydrogeologists join the Hamilton team

The WGA Hamilton team, based at the Ruakura Research Centre, has welcomed two new hydrogeologists.



Erica Cammack joined WGA in April 2026 as a Hydrogeologist. Erica is an engineering geologist and hydrogeologist with over 10 years' experience across transport, tunnel, rail, energy and water infrastructure projects in Australia and New Zealand, including hydrogeological assessment for the Waterview Connection in Auckland and geotechnical and hydrogeological assessment of karstic terrain for the Waitahora Wind Farm.

Since joining WGA, Erica has undertaken hydrogeological assessments supporting Fast Track applications for large-scale housing developments.



Toby Beisly joined WGA in February 2025 as a Graduate Hydrogeologist after completing a Master of Environmental Sciences at the University of Waikato. His thesis investigated the vertical distribution of sediment fluxes on an intertidal mudflat using acoustic velocimeters and optical backscatter sensors. Since joining WGA Toby has been spending many days in the field alongside drill rigs and following up with logger installs and data downloads. He has been enjoying mapping and modelling the effects for various planned excavations and dewatering across the Waikato.

Shallow groundwater investigations in the Hamilton Basin

WGA is conducting shallow groundwater investigations using the Brown Bros small Geoprobe rig (as seen on display at NZHS conference last year in Hamilton) and installing shallow groundwater monitoring bores across the Hamilton Basin to support development design, geotechnical assessments, and dewatering monitoring and assessments.



Direct-push drilling provides continuous core for logging of the shallow basin sediments. It is particularly useful for identifying thin silt aquitard layers. The piezometers are used to establish baseline groundwater levels and ongoing monitoring.

LDE and WGA 4WD Course, Napier

This year's WGA+LDE annual gathering in Napier included a four-wheel-drive course for staff from both businesses. The course covered safe vehicle handling on steep grass slopes, farm tracks and river crossings, building practical skills for accessing the rural and remote sites where our teams undertake investigations and monitoring.







Water New Zealand Conference 2026

WGA+LDE staff attended the 2026 Water New Zealand Conference in Hamilton alongside colleagues from LDE and WGA Australia.



Pictured (left to right): Jono Mumford (LDE), Olivia Oliver (WGA), Clare Houlbrooke (WGA) and Karl Timmins (LDE).

UPDATE

Pattle Delamore Partners (PDP)

Compiled by Nic Love

It's been a milestone year for PDP, with celebration of our 40th anniversary. Ngā mihi to all who have been part of our journey.

People: New starters

Through 2026 we've continued to grow our multidisciplinary team and are excited to welcome **Mark Pennington** as our new Technical Director – Water Resources, and **Alex White** as Senior Hydraulic Modeller, both based in Tauranga.

Mark is a highly respected leader in hydrology and hydraulic engineering, with extensive experience modelling complex river and flood systems. Known for combining strong technical expertise with practical thinking, he has played a key role in shaping approaches that balance flood protection with ecological and environmental outcomes.



Mark is also recognised for communicating complex concepts clearly, whether working with project teams, communities, or presenting expert evidence through consenting and hearing processes. We're proud to have Mark join our Water Resources team and support the delivery of practical, resilient solutions for communities and the environment.

Alex is a senior hydraulic modeller with specialist experience in urban stormwater and river modelling. Throughout her career, she has had a big focus on developing hydraulic models for catchment-scale floodplain mapping, on projects across New Zealand, Australia and the Pacific.



Alex is well-recognised in the industry, having delivered presentations at multiple conferences and through the peer review of her work. Highlights of her career include projects where she has navigated unchartered territory, and developed new solutions to complex problems. Her strengths lie in thinking creatively and upskilling in new areas, keeping her at the forefront of hydraulic modelling practice.

Nau mai, haere mai, Mark and Alex!

Project: Beachside Sumner Apartments natural hazards assessment



Beachside Sumner Limited engaged PDP to prepare a Section 106A natural hazards assessment under the Resource Management Amendment Act 2025 (RMAA).

We assessed the key natural hazards at the site, including pluvial flooding, fluvial flooding, coastal erosion, coastal inundation, and tsunami. For each hazard, we determined the 'hazard risk' using a risk matrix based on likelihood and consequence definitions, as required under the National Policy Statement for Natural Hazards 2025 (NPS-NH), which came into effect on 15 January 2026.

This was the first assessment of its kind carried out under the NPS-NH in Christchurch. Independent experts reviewed our assessments, and an independent expert panel made the consent decision. The apartments were successfully consented.

Project: Surcharge monitoring

PDP are currently involved in surcharge monitoring for a residential developer. The proposed subdivision is underlain by peat which is being surcharged to consolidate the peat to provide sufficient bearing capacity for residential structures.

The site is characterised by a shallow groundwater table and has a number of springs and streams present in the local vicinity. PDP has implemented a detailed monitoring programme of groundwater levels, stream flows, stream stage height and ground subsidence to monitor the effects of the surcharging.

Project: Constructed wetland monitoring

Christchurch City Council engaged us to carry out long-term monitoring at a constructed wetland facility. This has involved comparison of the design intentions against real-world results for hydraulic performance and treatment efficiency.



Our team has been braving the weather to collect water quality samples during rain events, using autosamplers, grab samples and long-term monitoring with EXO sondes.

We are also carrying out stage height and flow gaugings at various points across the facility. We are looking forward to capturing a few more rainfall events over the coming months, so we can build a clear picture of how the facility is performing.

Practice and upskilling: Out and about



We've been out practising our safe work in water skills, visiting several locations around the country in varying weather and flow conditions to keep our rescue skills sharp.

Regular practice like this builds on what we learn in training and swift water courses, and it's a good reminder that skills fade fast without it.

UPDATE

KISTERS

KISTERS New Zealand: field, software and community updates

Compiled by Jessica McKenzie

A practical round-up for New Zealand hydrology practitioners: refreshed product resources, a new support portal, satellite connectivity for iRIS loggers, HydroTel 8, HyQuant Edge and dates for the 2027 user group and technical workshop.

About KISTERS

KISTERS has worked in environmental and water technology for more than 60 years, bringing together measuring instruments, dataloggers, telemetry, software and technical services. Its monitoring systems are used by government agencies, research organisations, utilities and other operators that depend on reliable water, weather and environmental information. The New Zealand team provides local implementation and support for field and data-management systems, backed by the wider KISTERS group.

This update brings together several changes that may be useful to NZHS members: practical guidance on connected monitoring, easier access to product information, new support arrangements, developments in satellite communications and edge sensing, a HydroTel software release, and dates for the next KISTERS user group and NZHS Technical Workshop.

Q3 Focus: choosing communications site by site

KISTERS Q3 focus led to creating a practical guide to selecting communications for environmental monitoring sites. It compares cellular, radio, Ethernet and satellite options and encourages teams to match the communications method to each site's purpose, coverage, power, data, access and outage requirements. It also covers local data storage, reconnection and automatic backfill - useful checks before wider deployment. Rather than prescribing one technology across a network, the guide provides a framework for choosing the most suitable option site by site. Resource: Connected environmental monitoring in New Zealand

A refreshed route to hydrometric product information

The KISTERS hydromet products website has been refreshed to make technical information easier to locate by product category and monitoring application. The catalogue now groups instruments and dataloggers across water level, water flow, meteorology, data acquisition, water quality and sediment sampling. It also provides separate routes to software, integrated monitoring systems, applications and calibration or support services.

For practitioners comparing components or preparing a monitoring-system specification, the site provides a useful starting point before a detailed discussion with the local team. Product pages, brochures and application information will continue to be added and updated as the catalogue develops.
Product catalogue:
hydromet-products.kisters-group.com/en-au

KISTERS NZ support portal now live

KISTERS New Zealand has introduced a Jira-based support system to provide a clearer record of requests, progress and resolution. Customers can register individual users or a wider team by emailing support@kisters.co.nz. Once registered, requests can be lodged and followed through the support workflow, helping both customer and support teams retain the relevant technical history.

For urgent requests during New Zealand business hours, the office remains available on 07 857 0810. KISTERS New Zealand also offers support contracts

for organisations that need elevated service levels or after-hours coverage. The appropriate arrangement will depend on system criticality, operating hours and internal response requirements.

Support contacts
Register for the Jira support portal:
support@kisters.co.nz
Urgent requests during business hours: 07 857 0810

New satellite communications for iRIS 270 and iRIS Undercover

Two new satellite communications features are now available for the iRIS 270 and iRIS Undercover dataloggers: Starlink Direct-to-Cell and Iridium. These options give monitoring teams additional ways to connect sites beyond dependable terrestrial coverage or to introduce a communications path with different infrastructure dependencies.

Starlink Direct-to-Cell enables compatible cellular IoT connections via satellite where terrestrial service is unavailable. Iridium provides an established satellite option for remote and low-power monitoring sites with modest data payloads. The appropriate choice depends on the site's reporting frequency, payload, power budget, sky view, outage tolerance and receiving platform.

KISTERS New Zealand can supply Starlink Direct-to-Cell SIM cards on request and help customers confirm the logger configuration and service requirements for a proposed site. The KISTERS New Zealand white paper provides further information on the integration approach and applications across hydrology, environmental quality, infrastructure, utilities and emergency management.

HydroTel 8 is now available



Figure 1. Starlink Direct-to-Cell and Iridium add satellite communications options for the iRIS 270 and iRIS Undercover. Image supplied by KISTERS.

Satellite information and white paper: kisters.com.au/starlink

HydroTel 8 is now available, and KISTERS New Zealand is progressively rolling it out to existing customers. Organisations that would like their HydroTel system updated sooner can contact the local team to discuss readiness, timing and any site-specific requirements.

HydroTel brings together field sensors, iRIS dataloggers, telemetry and external data sources in a central real-time environmental data platform. It is used across monitoring contexts including flood warning, catchments, reservoirs, ports, water levels, air quality and remote sites. Depending on the system configuration, the platform supports centralised data collection, alarms and notifications, reporting, integration with other systems, and remote device management.

An upgrade is also a useful point to review the wider operational environment: interfaces with existing field devices, alert routing, user access, cybersecurity requirements, reporting workflows, backups and support responsibilities. KISTERS will work through these considerations with each customer as the rollout proceeds.

New instruments: HyQuant Edge



Figure 2. HydroTel centralises data from distributed monitoring sites for operational visibility, alarms, reporting and integration. Image: KISTERS.

HydroTel information: kisters.com.au/product/hydrotel

HyQuant Edge is a new family of non-contact radar instruments that combines measurement, logging, processing, power management and communications in one compact unit. Unlike a conventional installation assembled from a separate sensor, datalogger and modem, the Edge architecture embeds these functions within the device. External power is still required, while an optional solar power pack is available for autonomous installations.

The range covers water level, surface velocity, combined level and velocity, and discharge. It includes local processing, internal storage, store-and-forward

behaviour, event-based transmission, remote configuration and device management. Data can be sent to an existing receiving platform or to KISTERS datasphere, so the device does not require a change of data-management system.

This architecture may be useful where a conventional station is difficult to install: remote or temporary sites, emergency deployments, network densification and constrained urban structures. It may also simplify field assembly and reduce the number of external components that need to be housed, wired and maintained. The appropriate version and deployment arrangement will still depend on the measurement objective, hydraulic conditions, mounting geometry, power and communications environment.

Save the date: KISTERS user group NZHS workshop



Figure 3. HyQuant Edge combines non-contact radar measurement, logging, processing, power management and communications in one compact unit. Image: KISTERS.

HyQuant Edge information:
kisters.com.au/product/hyquant-edge/

The next KISTERS New Zealand user group meeting will be held immediately before the 2027 NZHS Technical Workshop. The meeting is scheduled for Monday 15 March 2027, from 1 to 5 pm, at the Lower Hutt Events Centre. It will provide an opportunity for users to exchange experience, hear product and support updates, and discuss priorities with the New Zealand team. A detailed agenda and registration information will follow.

KISTERS is pleased to continue its support of the NZHS 2027 Technical Workshop as both Platinum Sponsor and Field Day Sponsor. The workshop remains an important opportunity for practitioners, researchers, suppliers and students to share technical work and strengthen the professional connections that support hydrology in New Zealand. We look forward to seeing NZHS members in Lower Hutt.

KISTERS NZ User Group - save the date
Monday 15 March 2027 | 1.00 - 5.00 pm
Lower Hutt Events Centre
Agenda and registration details to come

UPDATE

INTERA

Compiled by Jeremy Bennett & Zara Rawlinson

Staffing

INTERA Incorporated is excited to welcome three new additions to its New Zealand team in 2026: **Tara Forstner, Zara Rawlinson**, and **Ahmed Elwan.**

Tara (Hydrogeologist) brings experience in groundwater modelling and assessment across New Zealand and Canada, spanning water resources, mining, and natural hazards. Her recent PhD integrated Mātauranga Māori with hydrogeological modelling to examine groundwater dynamics at a culturally significant site in Hawke's Bay. Tara is focused on groundwater modelling support for local and international projects, with technical skills in MODFLOW, PEST++, SWAT+, and Python-based workflow development. You can contact Tara at tforstner@intera.com.

Ahmed (Senior Hydrogeologist) has spent the last seven years on regional-scale groundwater modelling for water allocation in New Zealand. His work is fully scripted ensemble modelling and uncertainty quantification using MODFLOW, PEST++ and PyEMU on high-performance computing, applied to allocation limits, minimum flows and stream depletion. The tools he built to communicate those probabilistic results are in operational use across council consenting, policy and planning teams. He prepared expert evidence for Environment Court proceedings on the TANK plan change and holds Making Good Decisions accreditation for resource consent hearing panels. You can contact Ahmed at aelwan@intera.com.

Zara (Senior Hydrogeophysicist) has spent the last seven years specialising in airborne electromagnetic (AEM) surveys for groundwater mapping across New Zealand, building on a broad foundation in geophysics, hydrogeology, and modelling. She is primarily supporting the New Mexico Airborne Geophysical Survey Project (Airborne Geophysical Surveys), working with the INTERA Albuquerque office, New Mexico Institute of Mining and Technology, and New Mexico Bureau of Geology & Mineral Resources. This project started in 2025 and is collecting AEM data and supplementary aquifer mapping datasets over most of New Mexico. You can contact Zara at zrawlinson@intera.com.



Ahmed Elwan



Tara Forstner



Zara Rawlinson

Working in water resources

INTERA is continuing to support clients in the water resources sector, including regional councils and water suppliers, with numerical model development and uncertainty analysis for decision support. Brioch (bhemmings@intera.com) has been working with Waikato Regional Council, facilitating groundwater nutrient transport management scenario modelling and associated uncertainty quantification. The team is continuing to support Greater Wellington Regional Council with water resource assessments in the

Lower Hutt and Kāpiti groundwater zones. INTERA is supporting Hawke's Bay Regional Council with a wide range of quantitative analyses for groundwater and surface-water allocation and management in the Ruataniwha basin. **Jeremy White**, our director of decision support science, led the earlier work, and Ahmed is continuing it.

Smarter dewatering decisions through practical uncertainty analysis

INTERA's **Savannah Miller** presented at the recent AusIMM NZ conference on a practical approach for helping water managers better understand the reliability of groundwater dewatering predictions. Traditional dewatering assessments often present a single "best-estimate" result: one drawdown forecast, one pumping requirement and one associated cost. However, multiple interpretations of the same pumping-test data can often fit observations equally well while implying very different operational and financial outcomes.

Savannah's work shows how a straightforward analytical model, combined with a Bayesian statistical framework, can provide decision-makers with a clearer view of the full range of plausible outcomes. Rather than asking managers to rely on a single forecast, the approach quantifies uncertainty and translates it into the measures that matter most for mine planning, including drawdown, pumping rates, energy use, operating cost and budget risk.

A key feature of the work is a proof-of-concept interactive dashboard (Figure 1) that visualises cost, risk and production trade-offs. This makes uncertainty easier to communicate and helps answer practical planning questions such as: "What is the probability that we remain within budget at this pumping rate?" Because the workflow is grounded in Bayesian probability, the analysis can be updated as new information becomes available, such as additional pumping-test data or revised dewatering designs.

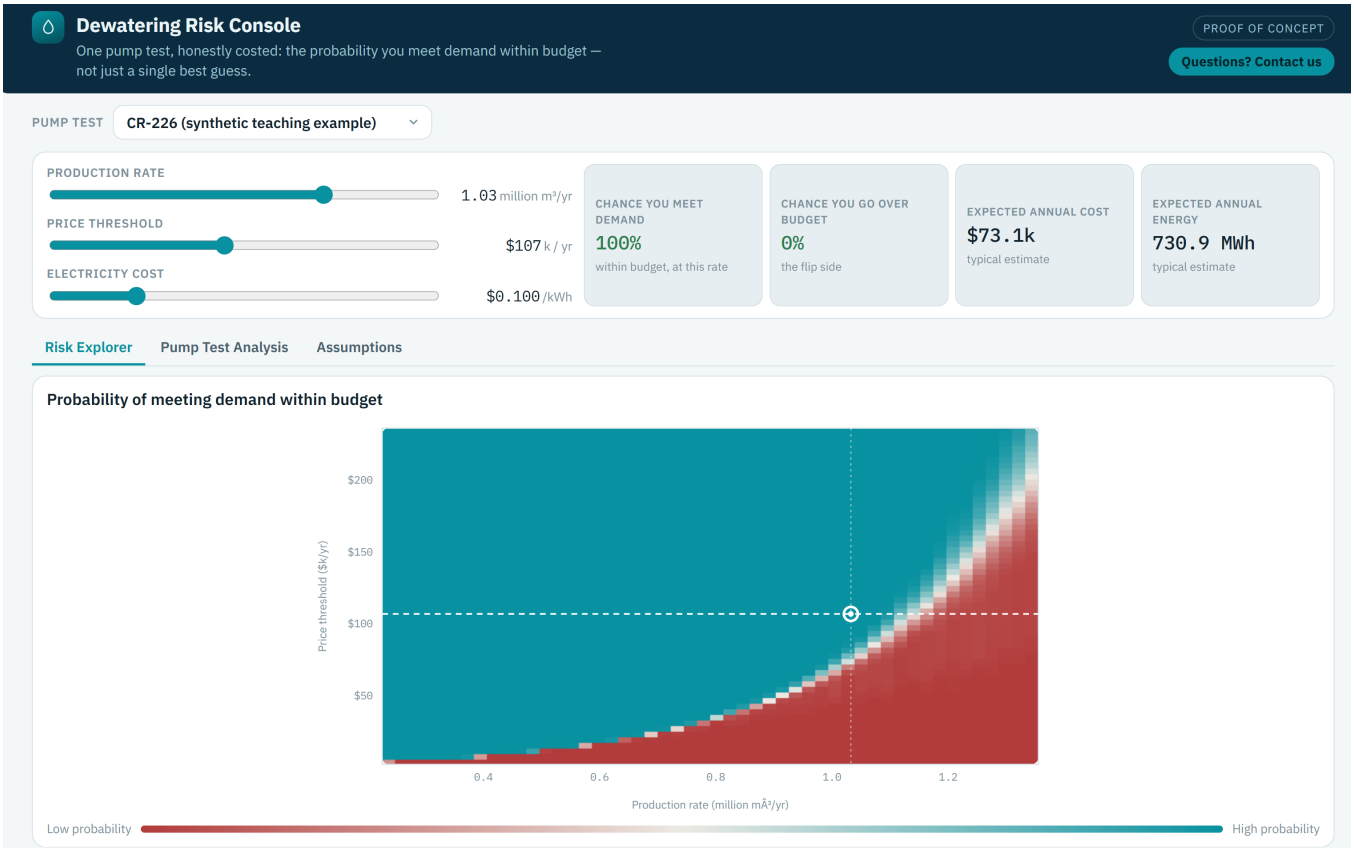


Figure 1: Interactive dewatering risk console.

This approach supports a shift from static, single-answer reporting toward living decision-support tools that improve over time. It offers a practical way to connect hydrogeological uncertainty with operational planning, financial risk and decision confidence when managing water resources. The interactive

tool is available at https://ausimm2026.up.railway.app/ and the work has been published in the Journal of Hydrology (DOI: 10.1016/j.jhydrol.2026.134952). Please reach out to Savannah (smiller@intera.com) or Jeremy (jbennett@intera.com) if you would like to know more about the approach.

About INTERA

INTERA is a 100% employee-owned geoscience and engineering consultancy, founded in 1974 and headquartered in Austin, Texas, with offices across the US, Europe, and Australia. INTERA has been active in New Zealand since 2020 and has a local team of five people located throughout the country. Find out more on our website: https://www.intera.com/

UPDATE

Aqualinc

Compiled by Kate Mason

Congratulations John!

Huge congratulations to our founder and director Dr **John Bright** who received an honorary doctorate in Natural Resources from Lincoln University.

In his address, John reflected not just on his career, but on the lessons that shape it:

• The importance of learning how to learn — and continuing to do so throughout your career
• Taking personal responsibility for your path, especially when things don't go to plan
• Seeing setbacks, even job loss, as opportunities for growth and redirection
• The lasting impact of mentors who invest in your journey
• And never underestimating the role of family and support networks behind any success

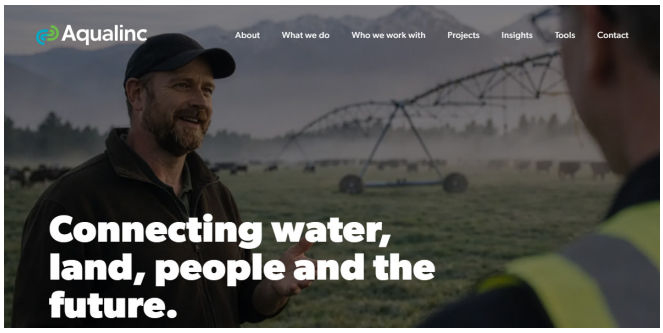


It was a thoughtful reminder that careers are rarely linear — and that resilience, curiosity, and strong relationships are often what matter most. A well-deserved recognition of both professional achievement and the values that underpin it.

We are incredibly proud of our director and colleague, **Dr John Bright.**

We launched our new website!

As part of our recent brand refresh, we're excited to launch our new website. Visitors can explore our areas of expertise and learn more about the services we offer. We'll continue to add project updates, insights, and news over time, so we encourage you to take a look and check back regularly.



AquaTalks

In August we launched AquaTalks, a presentation followed by a space for insightful conversations, networking, and idea sharing. Each session is an opportunity to connect with like-minded professionals, exchange ideas, and explore new perspectives.
Our first speaker was **Dr Andrew Dark** – Navigating new currents: Freshwater science and policy in action. After each presentation, we will host a networking break featuring a selection of refreshments for those who can attend in person. This provides a relaxed environment to continue conversations and build professional relationships.



Projects

The Aqualinc team remains busy, working across a diverse range of activities including consenting projects for primary sector and Council clients, source-water risk assessments, fieldwork such as sampling, gauging, and effluent pond drop tests, as well as a number of ongoing research initiatives.

Hydraulic modelling to support catchment management

Over the past six years Aqualinc, in collaboration with EOS Ecology, has worked with Selwyn District Council to develop a series of Catchment Management Plans (CMPs) for six lowland catchments and one foothills catchment with land drainage networks that discharge to Te Waihora/Lake Ellesmere. This work programme has aimed to shift the focus from managing drainage schemes solely for conveyance capacity towards a more integrated approach that considers water quality, biodiversity, cultural values, recreation, and productive land use together.

Aqualinc has played a central role throughout the programme, managing overall delivery and providing hydrological, groundwater and hydraulic modelling expertise. Working alongside EOS Ecology and other partners, Aqualinc helped develop the scientific evidence base underpinning each CMP and supported a co-design process involving local drainage committees, landowners, mana whenua, SDC and ECan staff.

The CMPs follow a structured process of identifying the key issues, opportunities and values within each catchment through technical investigations, ecological assessments, cultural input and stakeholder engagement. Potential interventions were then co-designed and evaluated to ensure they are likely to address the root causes of identified problems. Hydrological analysis and hydraulic modelling have been used to improve understanding of catchment processes, test management options, and assess likely outcomes before solutions are incorporated into catchment-scale master plans and implementation guides.

The result is a series of practical, community-supported and science-based plans that provide a pathway for improving waterway health, catchment resilience and environmental outcomes, while maintaining the drainage services that underpin productive rural land use.

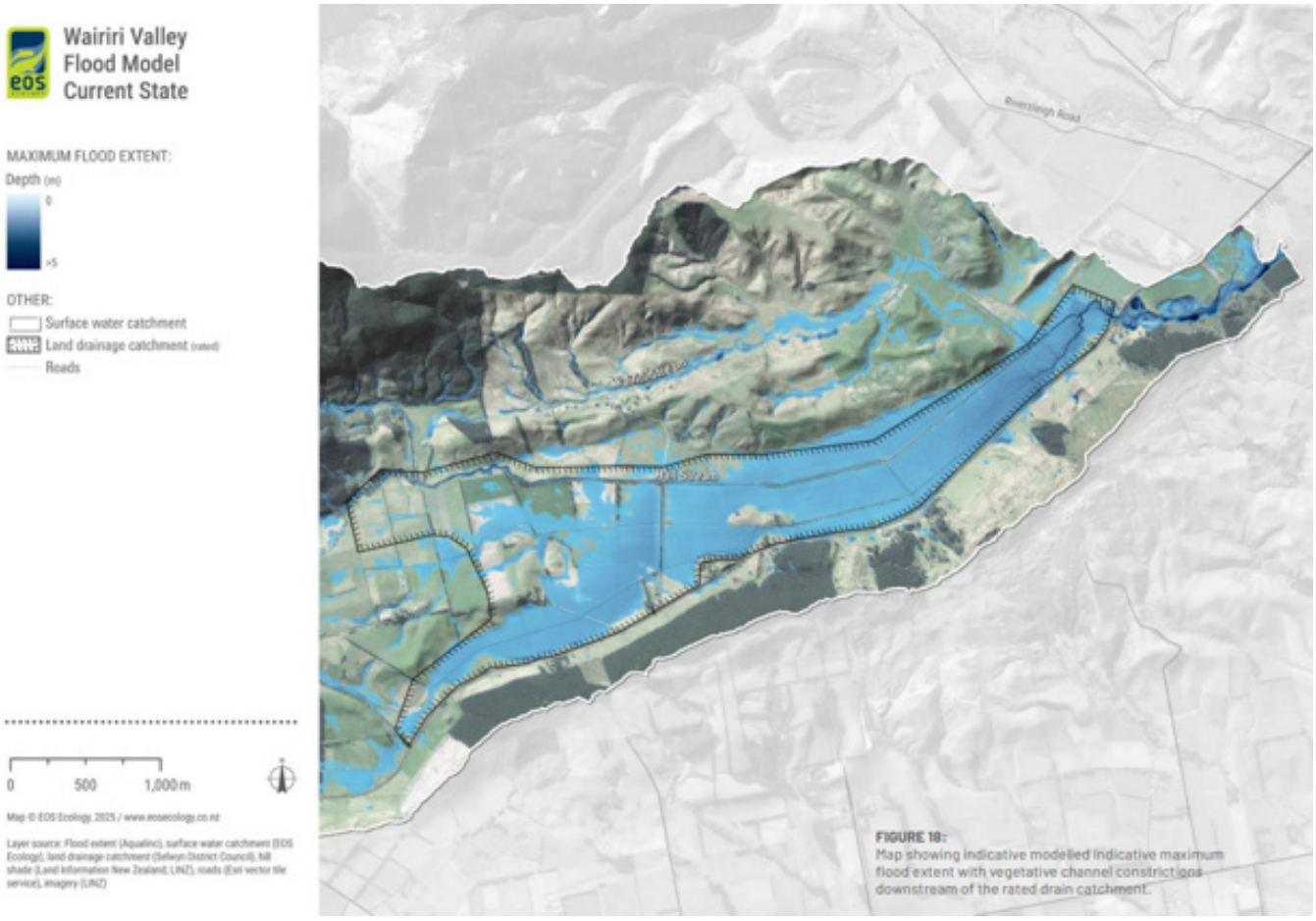


FIGURE 18:
Map showing indicative modelled indicative maximum flood extent with vegetative channel constrictions downstream of the rated drain catchment.

Further detail on how we used hydraulic modelling to support the CMP process is here: Hydraulic Modelling to Support Catchment Management | Aqualinc Research Limited

Next Generation Irrigation Demand Management Tools

Regional authorities manage irrigation water allocation by setting annual water use limits intended to represent a reasonable level of irrigation demand while encouraging efficient water use. These limits are primarily derived from outputs of Aqualinc's IrriCalc irrigation demand model and are widely used in policy, consenting, and compliance frameworks.

The growing availability of metered water use data has suggested that modelled irrigation demand may be systematically higher than actual measured water use. One of the first tasks in the Next-Gen irrigation demand management project was to test this assertion by quantifying the nature and magnitude of differences between modelled irrigation demand and measured irrigation water use.

The analysis drew on water meter and resource consent data supplied by nine regional authorities, covering more than 8,300 irrigation consents nationwide. Following rigorous filtering to ensure data reliability and comparability, a representative sample of 748 consents to use groundwater for irrigation was selected across key crop types and regions. Measured irrigation water use in a representative 90th percentile year was compared with the 90th percentile irrigation demand modelled using IrriCalc.

Across all regions and crop types, the results show a consistent and substantial gap between modelled irrigation demand and actual measured use. More than half of all consents had maximum measured use volumes that were moderately or significantly lower than the modelled 90th percentile demand.

The findings are broadly consistent across climatic zones, soil types, and most crop categories. Pasture and avocado systems show particularly large gaps between modelled and measured use, while grape systems exhibit greater variability, including a higher proportion of cases where measured use exceeds modelled demand.

Overall, the results indicate that current modelling approaches may be overly conservative and may not fully reflect on farm irrigation practices or site specific conditions. Possible contributing factors include efficient irrigation management, lower on farm irrigation trigger thresholds, shallow groundwater contributions, deeper rooting depths, and uncertainty in soil and climate inputs. While some degree of under irrigation cannot be ruled out, the consistency of the findings across regions and crops suggests that actual irrigation demand is often lower than currently modelled.

These findings have important implications for irrigation water allocation, demand modelling, and policy development. They highlight a clear opportunity to refine modelling assumptions, methods and inputs to better align modelled irrigation demand with observed water use, thereby improving allocative efficiency while maintaining productive and resilient irrigated agriculture.

Come to our special session at HydroSoc Conference 2026 to learn more about our responses to the findings of this analysis.



OBITUARY

Remembering John Porteous

By Marty Flanagan

John worked with NIWA and its predecessor organisations for 42 years. He was the Team Leader of the Greymouth Field Team for 30 years, achieving Principal Technician level (Environmental Monitoring), with lived experience in aspects of 'Operational Hydrology'. As a senior field hydrologist, John developed a high level of expertise in practical field hydrology measurement, hydrological data analysis, quality assurance, data reporting, rating curve developments and maintaining their changes over time, especially for the dynamic rivers of the West Coast region.

Originally from the North Island, John joined the Ministry of Works and Development (MWD) in 1982 and underwent training in laboratory water quality analyses from the Whangarei Catchment Commission and the Surveying-Hydrology department from Keith Russell (Whangarei Team Leader). John moved to Wellington in 1983 to join the MWD's Hydrology field party. During the next three years, while studying for his NZCS, he carried out routine hydrometric data collection and processing, sometimes liaising with Wellington City Council, Wellington Regional Council, Manawatu Catchment Board and Wairarapa Catchment Board staff.

Moving to Greymouth in 1986, John broadened his experience and skill-base, eventually doing much of the data processing work for the MWD team, and handling nearly all the analyses for the various hydrological investigations carried out for commercial enterprises such as mining, forestry, and power generation. He settled in Cobden, putting down roots on the West Coast and raising a family of two boys.

Having passed through the various organisational transitions from MWD to DSIR to NIWA through the late 80s to early 90s, John took over the team management of the Greymouth NIWA Branch office in 1995. He maintained his role as NIWA Field Team Leader from then, overseeing the eventual relocation of the team to its new Kaiata office in 2016.
Over the years, he very capably mentored and trained many NIWA field staff in the practical applications of field hydrology, usually from cableway or jetboat deployments, and nearly always in the rain. He regularly provided advice to regional council organisations and commercial companies on their hydrological data requirements, completing many data collection investigations to assist resource consent applications. His commitment to maintaining the West Coast region's network of hydrology, rainfall and climate sites provided a remarkable contribution of valuable data. John leaves a legacy of high-quality hydrological observations and data records for New Zealand from over four decades of dedication.

Our friend and colleague John Porteous passed away peacefully in Greymouth Hospital on 5 August 2025, after losing a hard-fought battle with cancer.



