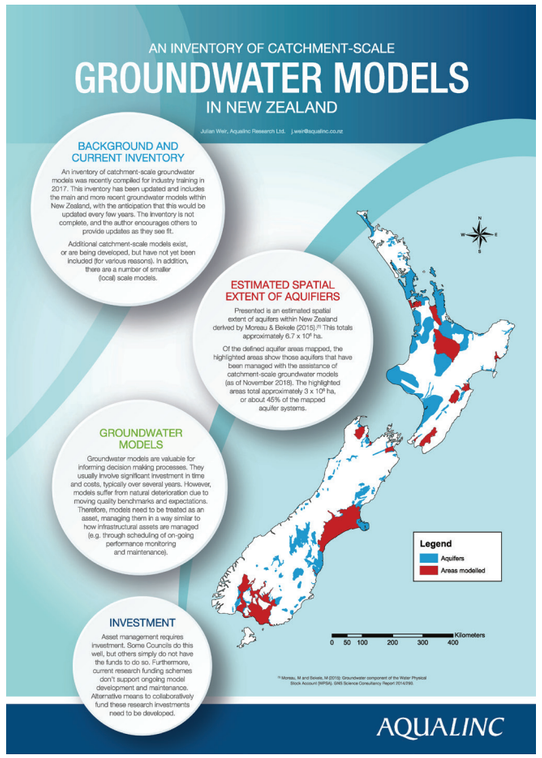
# New Zealand Hydrological Society Conference December 2018 — News

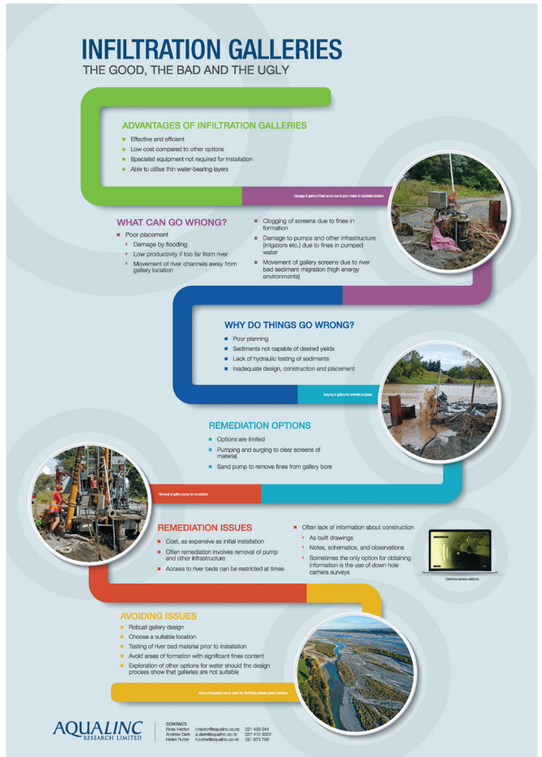
**Aqualinc was the principal Sponsor for the Hydrological Society of New Zealand. At the end of last year (December 2018), the Society's annual conference was held in Christchurch, and had a record-breaking number of abstracts submitted.**

Aqualinc were heavily involved in the organisation of the conference where approximately 400 papers and poster papers were presented over the three days of the conference. We also helped organise the field trips, one being to the Central Plains irrigation scheme, and the other focussing on urban hydrology within the Christchurch area.

Aqualinc presented nine papers and three poster papers on varying subjects, including predicting groundwater levels, optimising irrigation requirements, climate change impacts on water resources, export of nitrate and phosphorous from dairy grazed pastures, and trouble-shooting infiltration galleries. The three poster papers are shown on this page. For further details go to www.aqualinc.co.nz/newletters










AQUALINC

ISSUE 12 / **AUTUMN 2019 NEWSLETTER**


*Some of the Christchurch based team outside the new office*

# Aqualinc and HydroServices Now Located in the One Office

**Following the successful merger of Aqualinc and HydroServices in 2016, we have now both moved offices and are all found in the one location at 1 Bolt Place, near Christchurch airport.**

Aqualinc has offices in Christchurch, Ashburton, Hastings and Hamilton, and employs over 40 staff.

The merger allows us to provide whole water management solutions from research through to on-farm advice and monitoring. Our services include:

- **Irrigation management** — On-farm soil moisture monitoring and providing expert irrigation management advice;
- **Data logging and telemetry services,** including ongoing support;
- **Resource Consents** — Preparation of consent applications and the supporting assessment of environmental effects relating to consent applications to take and use water and to discharge effluent and wastewater to land;
- **Irrigation** — Assisting irrigated agriculture to be both profitable and environmentally sustainable. This work includes modelling irrigation water requirements, irrigation design and management, irrigation efficiency, irrigation scheme planning and feasibility studies and design;
- **Groundwater** — Aquifer testing, well and pump performance testing, groundwater level forecasting, groundwater modelling (integrated with surface water), hydrological assessments;

## IN THIS ISSUE…



*Continued on page 2…*

…Continued from page 1

- **Land treatment of effluent and wastewater** — provide design and management advice;
- **Land Use Impacts** — Undertake a 'whole system' approach to assessing the effects of land-use activities on groundwater quality;
- **Water Management** — Water quality protection and sustainable water allocation; and
- **Research** — To equip communities and individuals with knowledge and tools for water and nutrient management.

## South Island Agricultural Field Days (SIAFD)

March 27 to 29
1191 Courtenay Road, Kirwee

**Aqualinc will be available at the SIAFD for any questions that you may have. We look forward to seeing you there.**

# Reducing Nutrient Losses Through Improving Irrigation Efficiency

**A pilot study led by Dr John Bright, Director of Research and Development at Aqualinc, funded by the Fertiliser Association of New Zealand has shown that it is possible to significantly reduce nutrient losses to water by changing irrigation practices.**

| MONTH | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR |
|---|---|---|---|---|---|---|---|---|
| **Irrigation trigger** (% of soils water holding capacity) | 20% | 40% | 50% | 50% | 50% | 40% | 30% | 20% |
| **Irrigation target** (% of soils water holding capacity) | 80% | 80% | 80% | 80% | 80% | 80% | 80% | 80% |
| **Note:** Appropriate irrigation trigger level will vary year to year depending on crop and climate. | | | | | | | | |

*Table 1: Irrigation trigger level and irrigation target that reduced nutrient losses*

This study used existing data from 12 representative dairy farms located in Canterbury to investigate the effects of different irrigation management rules on pasture production and nutrient losses. The data was used within three computer models; Irricalc (irrigation system simulation model), DairyMod (pasture growth model), and Overseer (nutrient loss model).

A rule of thumb is to typically irrigate when soil moisture drops below 50% of the plant available water (PAW) (irrigation trigger) and apply sufficient depth of water to refill soil moisture to 90% of PAW or greater (irrigation target).

This study showed that nutrient losses can be reduced on average by 27% (range of 4 to 58%), by reducing the irrigation trigger level below 50% during the shoulders of the irrigation season and reducing the irrigation target to 80% (see table 1). Irrigating the soil to 80% of PAW and leaving 20% for rainfall allows for better utilisation of rainfall. The results of the drainage and pasture production analyses suggest there is benefit in terms of reducing drainage in reducing the target irrigation application depth to 80% of PAW. This can be done without adversely affecting average annual pasture production for a given trigger level set. Further details can be found at www.fertiliser.org.nz

Successfully operating your irrigation system to achieve a reduction in nitrogen loss to water will require the following:

- An irrigation system that can be adjusted to apply small application depths with a short return period (e.g. centre-pivots and solid set sprinklers). Approximately 72% of the irrigation area in Canterbury uses methods that could implement these irrigation rules.
- Soil moisture monitoring and interpretation of the data.
- Reliable water supply and irrigation infrastructure.

The advantages of implementing these irrigation rules include:

- Reduction of nutrient losses to water.
- Increased irrigation and rainfall efficiency.
- Reduction in irrigation water use.
- Reduced costs of pumping where relevant.
- May go a long way towards meeting the nitrogen loss reductions required by the Environment Canterbury Land and Water Regional Plan in some areas.
- Soil moisture data can be used to provide evidence of reduced drainage and nutrient losses for Farm Environmental Plans.

Continued on page 3…

Continued from page 2…

Aqualinc provides a soil moisture monitoring service with advice on how to operate your irrigation system to achieve the above irrigation trigger and irrigation target levels. These are tailored to the on-farm irrigation system, crop, soil types and climate. If you are interested in further guidance on how you can implement these strategies please contact:

**Phil Neill** — Business Manager: 027 457 9863

**Mark Fitzgibbon** — Area Manger Mid/South Canterbury: 027 457 0413

**Melanie Smith** — Area Manger North Island: 027 4447 349

# 2018 Rainfall — An Unusual Year?

**The total annual rainfall for 2018 was recorded as 950 mm at the Winchmore weather station, Canterbury, which is considerably higher than the average recorded rainfall of 739 mm at this site.**

Unusually the highest monthly rainfall was recorded in February, at 195 mm, with 107 mm falling on a single day (21st), following ex-cyclone Gita, causing flooding in many areas. Little irrigation was required at this typically high irrigation demand time. The next highest monthly rainfall was recorded in November at 164 mm, which forestalled irrigation starting (for many irrigators) until December.

Rainfall has been recorded at the Winchmore weather station since 1947 and records show the following:

- Minimum annual rainfall – 411 mm (1978)
- 1 in 10 year low annual rainfall — 512 mm
- Average annual rainfall — 739 mm
- 1 in 10 year high annual rainfall — 980 mm
- Maximum annual rainfall — 1,122 mm (1988)

Monthly rainfall for 2018 has been compared with the monthly minimum, maximum, 1 in 10 year low, 1 in 10 year high and average annual rainfall, as shown in the figure below. This shows that rainfall recorded in February 2018 was the highest recorded for this month. Rainfall recorded in November was higher than a 1 in 10 year event. Generally, 2018 rainfall was lower than typical during the winter months.

For comparison, monthly rainfall for 2017 has also been presented and shows almost a reversal of the monthly rainfall that fell in 2018. Although 2017 was a high rainfall year at 876 mm, during February only 10 mm of rainfall was recorded. During winter, July recorded 205 mm, which is the maximum recorded for this month. November was also a very low rainfall month with only 3 mm recorded.