

# Australasian Hydrographer

October 2023



AUSTRALIAN  
HYDROGRAPHERS  
ASSOCIATION

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**Australian Hydrographers Association**

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**Material Submitted**

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**Acknowledgement of Country**

The AHA acknowledges the Australian Aboriginal and Torres Strait Islander peoples of this nation. We acknowledge the traditional custodians of the lands on which our association is located and where we conduct our business. We pay our respects to ancestors and Elders past, present and emerging. The AHA is committed to honouring Australian Aboriginal and Torres Strait Islander peoples' unique cultural and spiritual relationships to the land, waters and seas and their rich contribution to society.

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# From the Editor-In-Chief Zac Ward



Not long now until another fun-filled, action-packed year draws to a close. With the end of 2023 only a few months away I'd like to take this opportunity to remind everyone about National Certification Renewals which are also coming up for a lot of Hydrographers. Whether you're a fresh-faced, new AHA Member, or a continuing Certified Cadet Hydrographer (CCH), Certified Associate Hydrographer (CAH) or Certified Practising Hydrographer (CPH), ongoing Continual Professional Development (CPD) is imperative.

More information on AHA Membership and Certification can be found [here](#), with the following CPD evidence required every two years to ensure continuing Certification:

**How to accumulate points to satisfy CPD requirements for re-certification.**

**Note: Documented proof required.**

- Remain active in industry in an area related to certification in hydrometric monitoring
- Provide CPD evidence every 2 years:
  - Certified Cadet Hydrographer (CCH), 8 points
  - Certified Associate Hydrographer (CAH), 9 points
  - Certified Practising Hydrographer (CPH), 10 points

Keep in mind that submission of AHA Journal material can result in a maximum of 4 points awarded for your CPD! In saying this, it is unfortunate that once again we have had zero AHA Member submissions for the Australasian Hydrographer (both pictures and articles) so once again in this edition I will have to lean heavily on the recent AHA Conference 2023 presentation archive for useable content.

I encourage everyone to please reach out with material for our final AHA edition of 2023 (due end of December) whether it be relevant photographs, case studies, recent projects, hydrographic learnings, etc.

[publication.thinktank@aha.net.au](mailto:publication.thinktank@aha.net.au)

I'm always happy for chat so please don't feel apprehensive about submitting and I look forward to hearing from AHA Members before the year is out and we're all on a well-earned, well-deserved break.

Cheers,

**Zac Ward** CPH

# Hello, we're KISTERS.

After 48 years, HyQuest Solutions is now KISTERS Instruments Pty Ltd (KISTERS Australia for short), effective from June 1st.

Our new name aligns with our evolving vision and growth, while our commitment to enhancing environmental data collection and precision instrumentation remains unchanged. Rest assured everything you love about us stays the same.

We thank you, our customers, for your continued support and trust in us. We look forward to continuing our partnerships, and together, unlock new possibilities and solutions that keep life thriving.

**We are here to help.**

Learn how we can support your operations.

[Request a consultation](#)

**KISTERS**  
Empowering decisions of tomorrow



**SURFBEE** v 0.58

# SURFBEE.io

**A STEP CHANGE IN ADCP DEPLOYMENT.**

Take advantage of GPS autonomous gauging. Allowing the Hydrographer to concentrate on the data not the deployment.

**FEATURES**

- ✓ Steering Redundancy
- ✓ Position Hold Mid Stream
- ✓ Common Battery
- ✓ ADCP or Transducer Specific Mounts.
- ✓ Autonomous Transects (Moving Vessel and Stationary)
- ✓ Waypoint Mission Planning (Bathymetric Survey)
- ✓ RTK GPS
- ✓ Surfbee Powered ADCP

ADCP





PORTABLE, PRACTICAL, AUSTRALIAN MADE AND SUPPORTED



# From the President

## Arran Corbett



As another busy year comes to an end, we're closely monitoring the formation of what might be the earliest cyclone of the season (since records began in the 1970's). Hopefully, this system will stall and dissipate over the Coral Sea, sparing us from a particularly destructive start to the wet season. Time will tell...

Leading the way in preparing for Queensland's wet season hydrographic needs is the Hydrographic Support Unit (HSU) of the Department of Regional Development, Manufacturing, and Water (DRDMW). Recently, the HSU celebrated its 30th anniversary with an impressive turnout of current and former staff, as well as their hydrographer customers. They gathered to celebrate the unit's enduring success. Emma Osborne, Acting Director of Water Systems and Hydrometric Operations, aptly summarised it, saying, "The fact that so many people travelled from near and far demonstrates the collective effort, resilience, longevity, and achievements of HSU." Well done, Team HSU; you are an outstanding example of the much-needed technical support our members require!

As you may recall from our conference in Penrith earlier this year, we are working on better supporting our colleagues in Water Quality monitoring. Our committee

has approved the formation of a sub-committee to advance this initiative and will be developing a roadmap. Dr. Ryan Turner and Tara Matthews will lead this effort. If you are interested in supporting this work or staying updated, please reach out to Tara at [tara.matthews@thermofisher.com](mailto:tara.matthews@thermofisher.com).

In other news, we are continuing our efforts to improve the underlying systems needed to deliver quality services for our members. This is a significant undertaking that will take some time to successfully implement. The down-select process is nearing its conclusion, and we expect to move to the implementation phase early in the new year.

Lastly, we're preparing for our 2023 Annual General Meeting. Several key committee roles will be open for voting this time. Keep an eye on your emails for information on nominations, proxy voting, and a call for papers.

Stay safe and enjoy the upcoming festive season!

Sincerely,

**Arran**

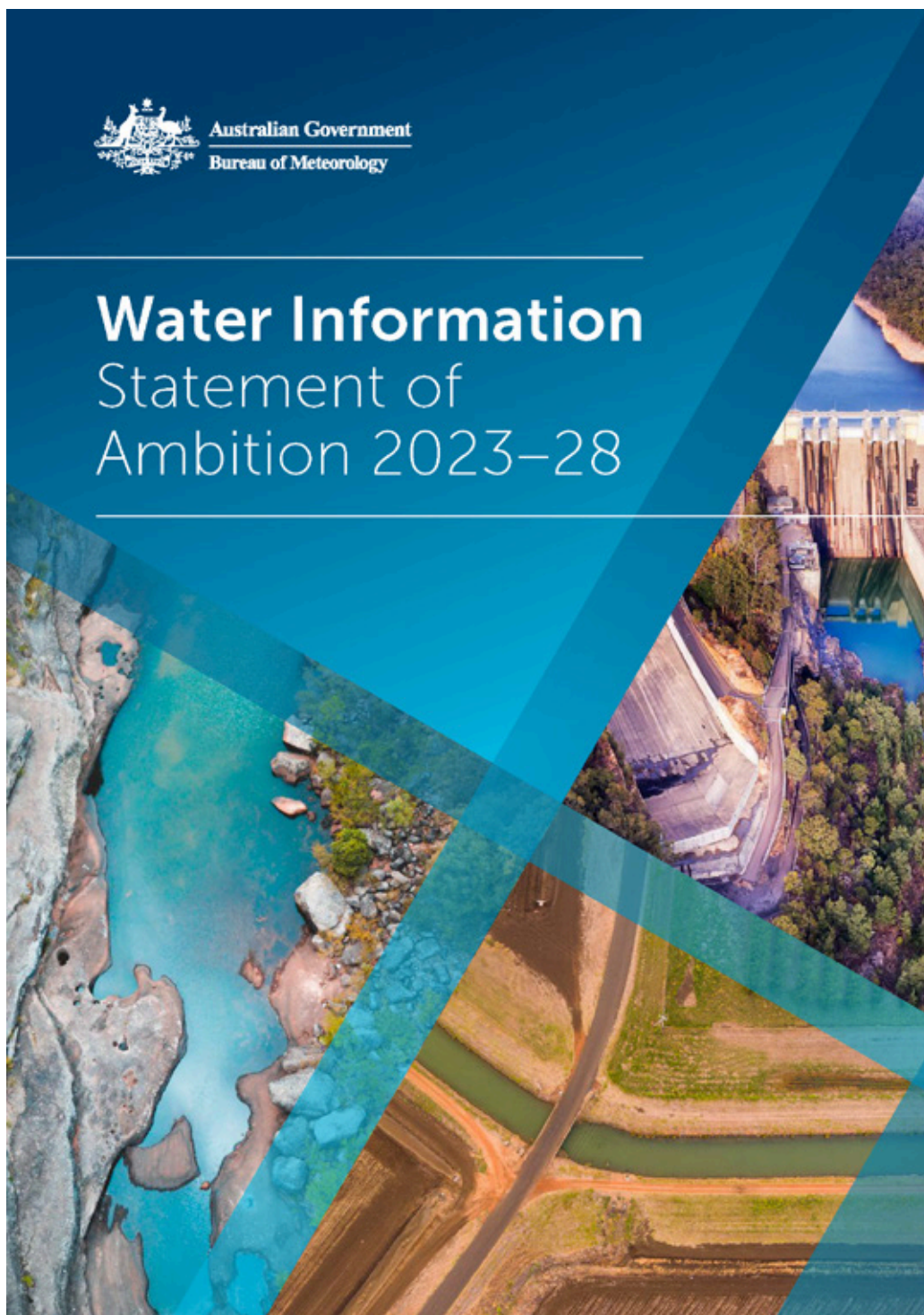


# Water Update from the Bureau

Presentation from the AHA Conference 2023. Greg Stuart – Flood Warning Infrastructure Integrator (Bureau of Meteorology)

## A Changing Water Climate

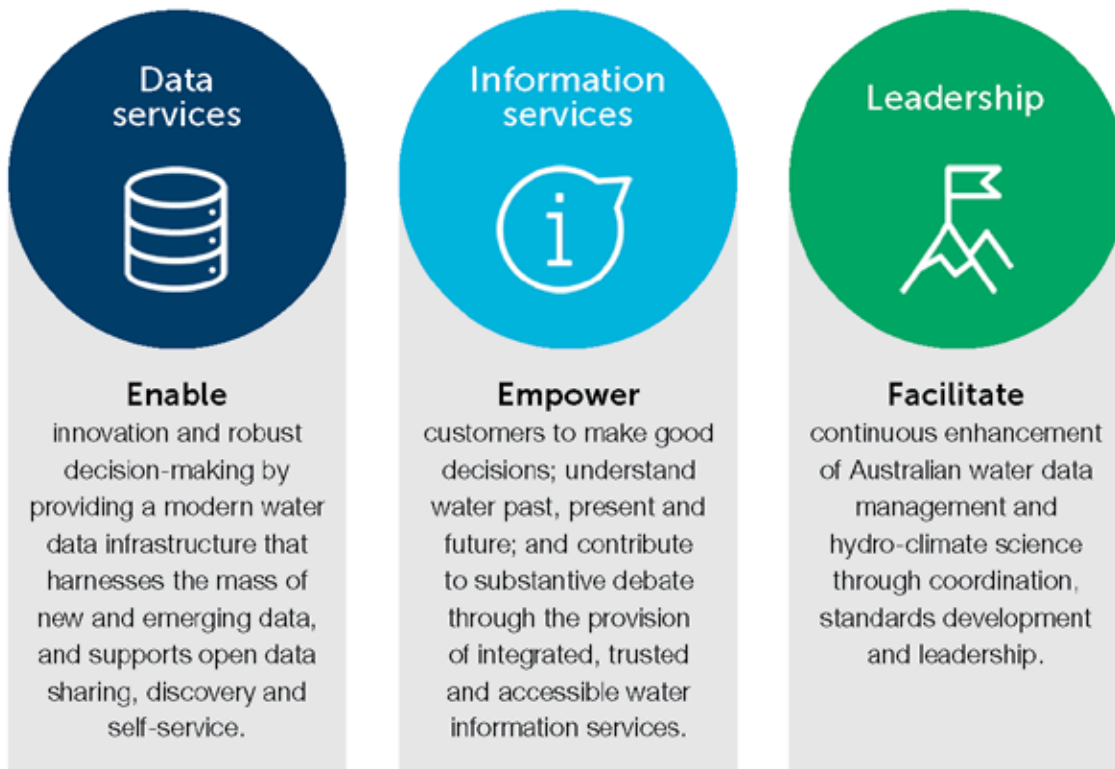
Our Statement of Ambition









## Vision and Objective

The Bureau will support Australia's water security, productivity and resilience through 3 pillars.



## What's Happening

-  Flood warning network upgrade  
Water information standards
-  A platform to access water and related information and insights
-  Upgraded models and products to improve Bureau services – Rainfall, Flood forecasts
-  Foundational infrastructure to collect, store, review and share water data – Water Data Hub







## Flood warning network upgrade program

### 2023/24 Budget Highlights



National, high priority Flood Watch Areas



The program will start in QLD



Up to \$236M has been allocated over 10 yrs



Bureau ownership & maintenance after upgrade



Detailed planning is now underway

## Water Markets Reform Support Program

### 2023/24 Budget Highlights



Water market data standards



New water market website



Up to \$32.7M over 4 yrs + \$3.4M p.a. ongoing



Single digital platform



## Upgraded Models and Products

### Existing Projects



- Enhanced lead time warnings in Hawkesbury-Nepean Valley
- Upgraded forecast & warning system for Southeast Queensland



- Consolidate the models used for flood, streamflow and landscape forecasting.
- Develop rainfall forecast products designed for hydrology modelling available to water agencies.



## Single Platform for Water Information

### Murray-Darling Basin Water Information Portal

#### MDB WIP



## Water Data Hub

### Murray-Darling Basin Water Information Portal

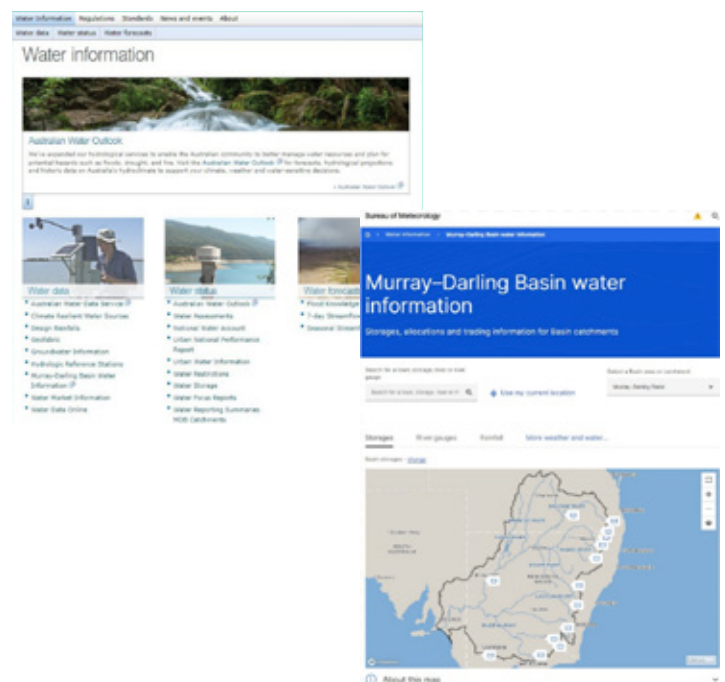
1 Platform for Information

26 Products

1 Data Hub

Catalogued data for download and subscription

Hard to find, not integrated, hard to use, expensive to maintain.



# Sunwater's Telemetry Approach

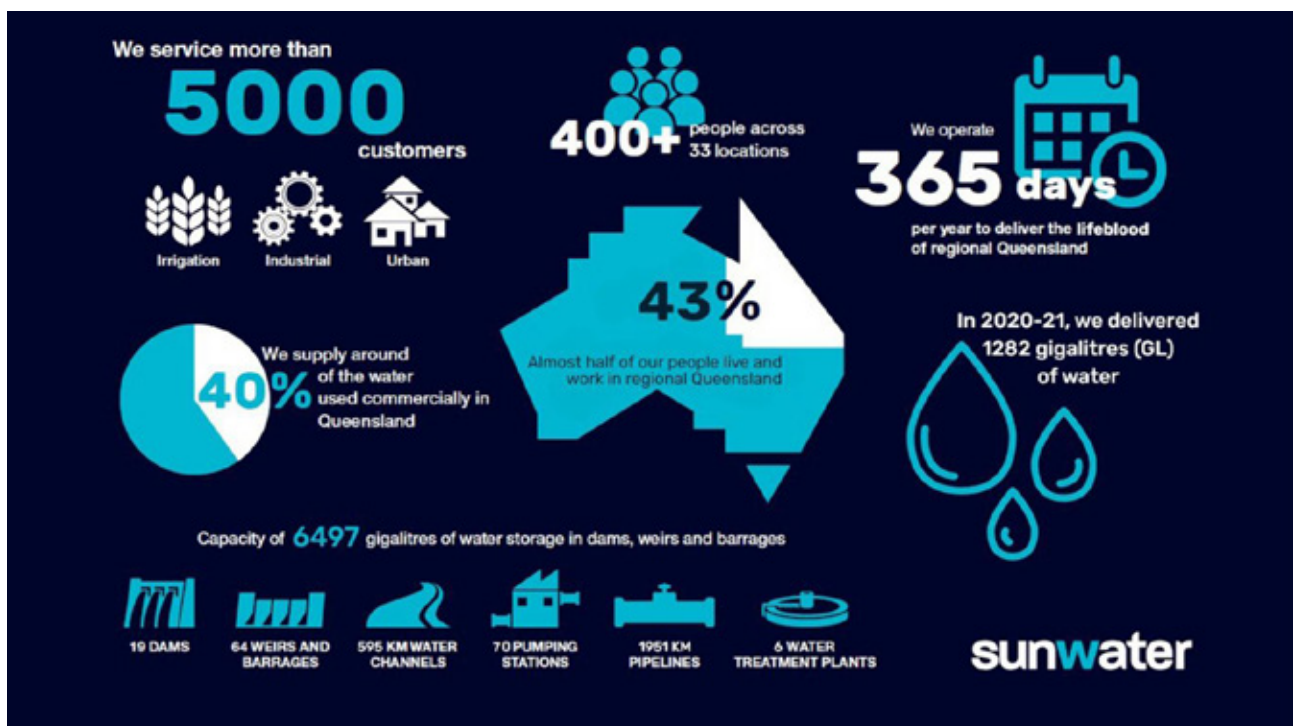
Presentation from the AHA Conference 2023.  
 Jason Venables – Senior Hydrographic Officer (Sunwater)

## Overview

- Who is Sunwater?
- Sunwater's Hydrographic Network
- Current Mobile Hydrographic Telemetry
- Future Mobile Hydrographic Telemetry
- Other Sunwater Telemetry Networks
- Migration to 4G
- Sunwater's Telemetry after June 2024



sunwater

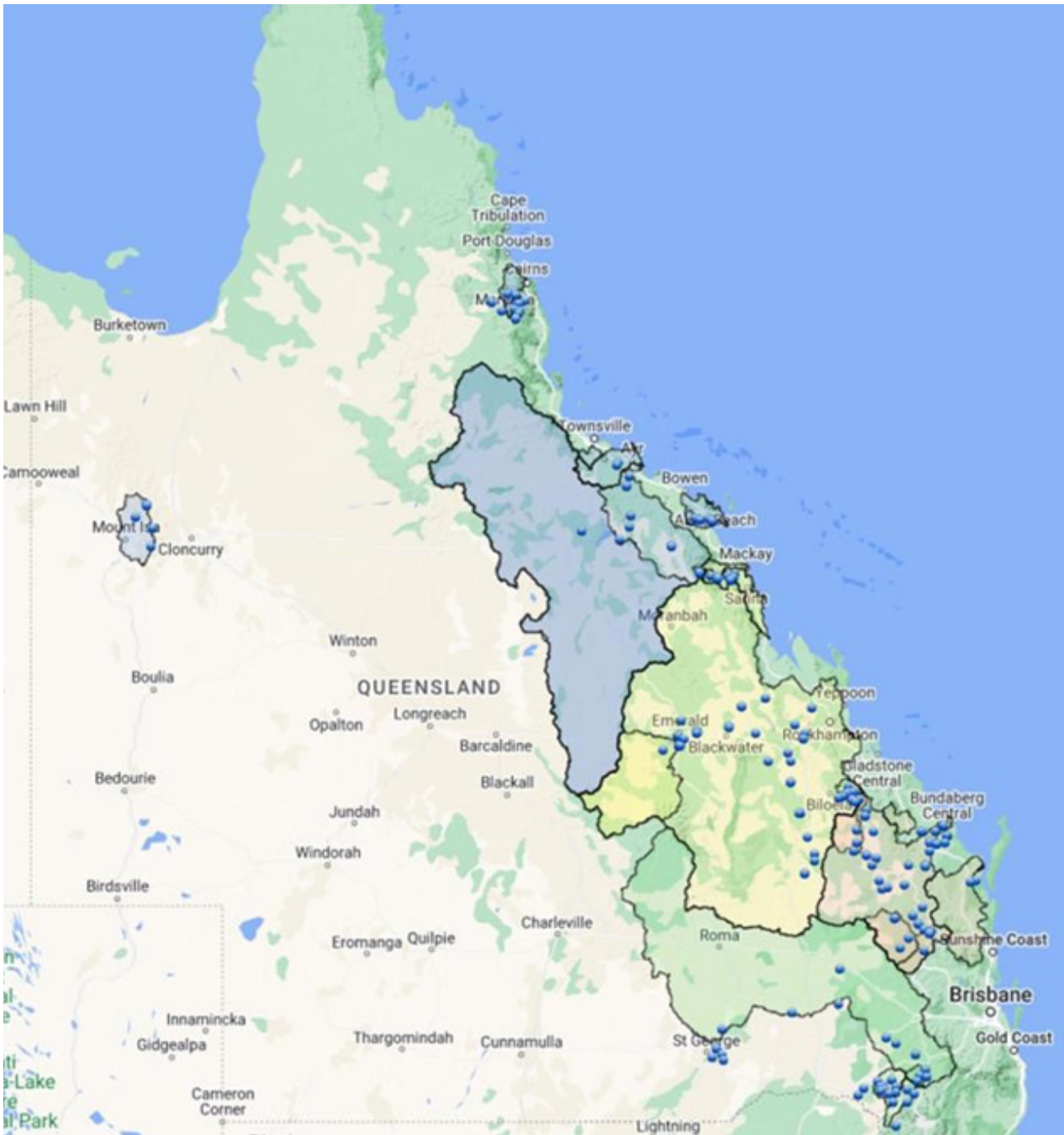




## Sunwater's Hydrographic Network

### Hydrographic Stations

- 62 Dams and Weirs
  - 60 Stream Gauging Stations (7 more to come)
  - 72 Rain Gauges (>20 more to come)
    - 39 are stand-alone units These sites are spread across:
- 23 water schemes within 4 regions
    - North
    - Central
    - Burnett and Lower Mary
    - South



Sunwater Water Information Network (WIN)

## Sunwater's Hydrographic Network

### What is the Hydrographic Network Used For?

- Water Operations – provides visibility of flows downstream of dam releases for customer water delivery
- Emergency Action Plans (EAP) – provides “near real-time” data for the activation and management of the EAP's during dam spill events. Sunwater are responsible for 23 EAP's
- Flood Early Warning System (FEWS) – Data feed into Sunwater's hydrology monitoring and inflow early warning system
- Notifying stakeholders of possible flooding – e.g. Queensland Emergency Services, local councils, and immediate downstream residences
- Water Compliance data:
  - Resource Operations License (ROL) – monthly and annual reporting to our regulator
  - Water Regulations – WDTF data to BoM23
- Other uses:
  - BoM QLD Flood Warning – hourly data to provide supplementary dam and river information
  - RDMW (Water Resources Regulator) – hourly data to supplement their network information
  - Water Harvesting announcements

## Current Mobile Hydrographic Telemetry

### Telstra 3G Mobile Communications

- Sunwater is reliant on Telstra's mobile network – 99% of the hydrographic network
- Scheduled for shut down in June 2024
- The 3G hydrographic network allows Sunwater to:
  - Dial site modems to remotely interrogate/ configure the data logger or the SDI-12 level sensor

- Send and receive an SMS message (e.g. “wdata” – returns current level, “rebootmodem” – reboots the modem)
- Send the data via FTP to the Sunwater FTP server
  - > Modem must initiate a Point-to-Point Protocol (PPP) connection to send the FTP data then disconnect afterwards
  - > Suspect that this connect/disconnect was a major contributor to modem lockups – requiring onsite reboots

### Telstra 4G Mobile Communications

- Sunwater has migrated about 65 water level sites to 4G (still about 65 3G only), which:
  - Allows for direct two-way communication of the modem, datalogger and SDI-12 sensor
  - “Near real-time” telemetry is maintained – i.e., up to 5-minute data transmission during events
  - Modems are always using an Internet Protocol (IP) connection
  - The data is still FTP'd but there is no network PPP connect/disconnect requirement
  - Possible to still utilise SMS'ing – some regional Operators use this, but hoping to move away from SMS querying
  - All data loggers host a web “Front Page” – summarising the station status

### Burdekin Dam Head Water Gauge or Woongarra Balancing Storage

- Currently using the Telstra extranet public Access Point Name (APN) – standard SIM card
  - Dynamic IP addresses – they can often change
  - Therefore, Sunwater is utilising a 3rd party Dynamic Network Address (DNS) service – Nolp
- About 10 stand-alone rain gauges are using Cat M1 using Halytech hydrospider dataloggers



## Current Public APN -NoIP DNS Configuration

The screenshot shows the NoIP web interface for managing hostnames. The main content area displays a table of hostnames with the following columns: Hostname, Last Update, IP / Target, and Type. Each row includes a 'Modify' button and a close icon. The hostnames listed are:

Hostname	Last Update	IP / Target	Type
sw422214a.ddns.net	May 11, 2023 00:06 AEST	120.157.113.237	A
sw422315b.ddns.net	May 11, 2023 00:13 AEST	123.209.92.231	A
sw422340a.ddns.net	May 11, 2023 00:13 AEST	123.209.116.22	A
sw422349a.ddns.net	May 11, 2023 00:13 AEST	123.209.92.117	A
sw422353a.ddns.net	Apr 20, 2023 13:31 AEST	203.39.155.65	A
sw422356a.ddns.net	May 11, 2023 00:13 AEST	123.209.116.48	A
sw422395a.ddns.net	May 9, 2023 16:37 AEST	120.157.28.91	A
sw630004a.ddns.net	May 11, 2023 10:13 AEST	120.157.95.73	A

## Woongarra Balancing Storage



### Woongarra BS - 136025A

17/5/2023 at 11:02:10

Parameter	Site	Value
Level (m)	Wet Sensor - 136025A	35.499
Capacity (%)	Wet Sensor - 136025A	91.17
Volume (ML)	Wet Sensor - 136025A	1224
Full Supply Level (m)	Wet Sensor - 136025A	35.75
Full Supply Volume (ML)	Wet Sensor - 136025A	1343
Hour Rain (mm)	Woongarra BS - 136025A	0.0
24 Hour Rain (mm)	Woongarra BS - 136025A	0.0
Battery (V)		14.39
Lithium Battery Status		3.38
Signal Strength (dB)		-59

## Future Mobile Hydrographic Telemetry

### Telstra 4G Mobile Communications

The future state will incorporate the current features, but

- connection will be on a Sunwater corporate APN
- Static IP addresses – no change, constant addressing for all sites
- No need to utilise a 3rd party DNS service but capability to create an internal DNS
  - using station numbers instead of IP address
- ICT security and firewall rules can be implemented on the APN

New installations may utilise 4G NB-IoT or Cat M1 network

- Lower cost, low power installations
- 2-way communications is not required
- Lower priority sites where less frequent data is acceptable
  - Information only

## Other Sunwater Telemetry Networks

### Other Telstra Mobile Communications

SCADA 4G and NB-IoT:

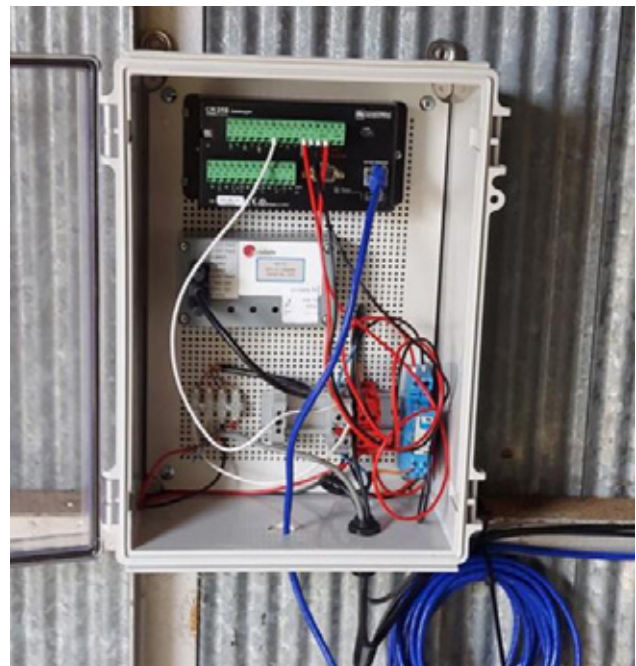
- SCADA telemetry network uses the Telstra 4G network (~60 sites)
  - Internal SCADA APN – high security on network (jump box access, not Corporate), data stored directly in PI Historian
- Customer meters (~90 sites), channel level monitoring (~35 sites) and a weather station
  - Typically, 15-minute data, pushed once per day but can be increased with solar power, e.g., 5-minute data pushed hourly
  - GeoSCADA (ex ClearSCADA) – data transferred into Pi Historian and devices can be remotely configured
  - All NB-IoT services can be managed using Jasper

- Metasphere Point Orange and 37South Site Sentinel devices

### Satellite Communications – no 4G reception or redundant comms Inmarsat BGAN

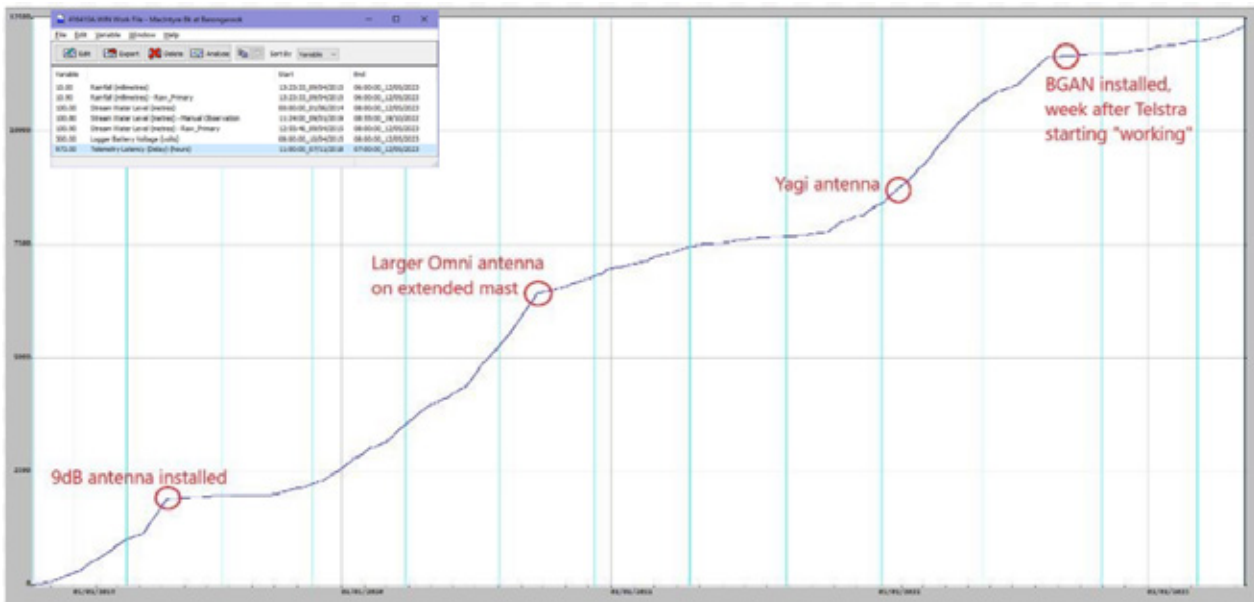
- Using a BGAN Cobham 540 terminal at a remote dam inflow site for redundant comms
  - 4G reception was decaying during the day but working at night
  - Affecting dam operations during spill events Dec-21 to Mar-22
- Another unit will be used at the new Rookwood Weir site – no 4G reception
- Allows 2-way communications for site interrogation and “near real-time” data transmission

An installation at Macintyre Brook at Barongarook:



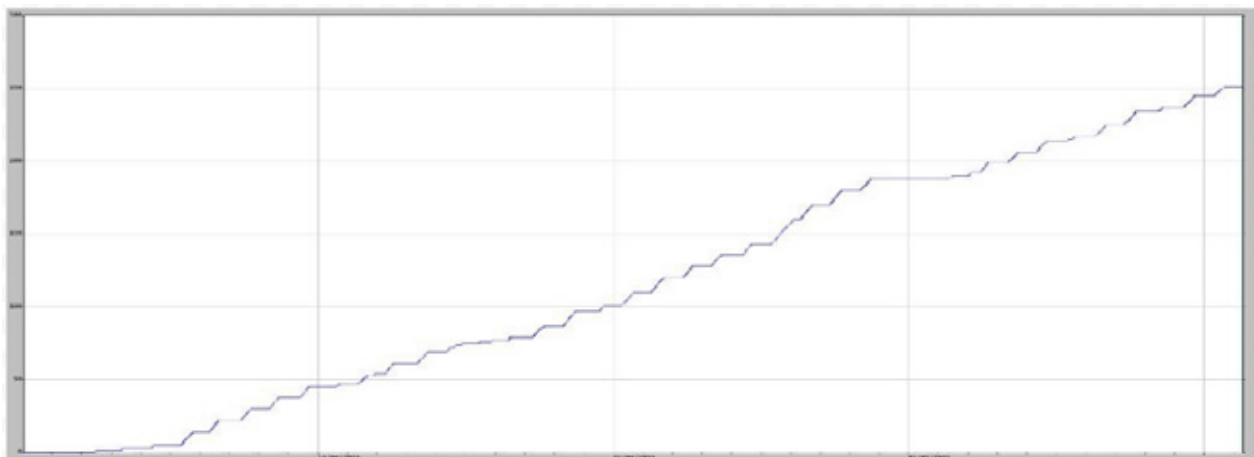
- Campbell Sci CR310 data logger, with
- Unidata SDI-12 listener on existing water level sensor
- Provides redundant communication





Barongarook "telemetry" latency plot - 2018 to 2023

sunwater



Barongarook "telemetry" latency plot - Mar to May 2023

sunwater

**Satellite Communications – no 4G reception or redundant comms Iridium Network**

- Using Ontoto Pulsar modems for remote rain gauge installations where there is no 4G reception
  - Data is transmitted once a day or every 10 minutes during events
  - No battery required – uses a “solar collector” to charge high power capacitors
- EWS Switch dataloggers (Iridium) to be used at 4 remote sites
  - 15-minute data with hourly data transmission, can be increased if required via two-way comms (30min, 15min or 5min)
  - Replacing a radio-hop site and another for redundant comms (with SDI-12 listener)



New Rookwood Weir downstream sites with no 4G reception



## neon IOT TECHNOLOGY

Robust neon Telemetry

Rich Connectivity Options



## Versatile Datalogger Range

## WATER - ULTRASONIC FLOWMETERS

Starflow QSD and  
Starflow QSD Conductivity



6527 Starflow QSD

6537 Starflow QSD Conductivity



Some of our Australian customers:





Lake Julius Upper Catchment Rain Gauge with Ontoto Pulsar Satellite Modem



Eungella Dam TW - 15minute data, 1 hour transmission, with EWS Switch (Iridium telemetry unit and datalogger)



**Satellite Communications – no 4G reception or redundant comms Iridium Network**

Starlink – broadband internet using low Earth orbit satellite constellations (LEOs)

Sky Muster NBN – broadband internet using 2 geostationary satellites (GEOs)

- Both satellite communication platforms are used within Sunwater
- Provides corporate connectivity at remote locations
  - Pump stations, dams and remote office locations

WiFi - Burdekin Dam – Hydrographic site is connected directly to corporate IP network

- Using a Ubiquiti Point-To-Point (PTP) device – office to instrument enclosure
- Higher power use – upgraded to 80W panel and 55Ahr battery



New Rookwood Weir downstream sites with no 4G reception



Burdekin Dam WiFi Telemetry Install Connected to Corporate Network via Satellite Broadband at Site Office

## Migration to 4G Telstra Issues

### Telstra 4G Mobile Network

An ICT request was made over 2 years ago to provide Hydrographics with a static IP address APN:

- Several delays from Telstra
- Changed ICT configuration, followed by
- More Telstra delays

At several sites that were upgraded to 4G modems:

- part shading on the solar panels meant that the battery was not able to meet the power demand
  - Dynamic IP address causing more searching from the modem(??)
  - Some modems were very data hungry, Gb instead of Mb – public IP address issue (??)
- Therefore, power is being upgraded at all sites
  - Typically, from 20W panels and 35Ahr VRLA batteries to
  - 40W or 50W panels (some shade tolerant) and  $\geq 40$ Ahr Lithium batteries
- Upgrades will generate waste – rubbish, recycling or donations to low budget projects
  - Solar panels, regulators, modems, batteries, etc.

## Sunwater's Telemetry After June 2024

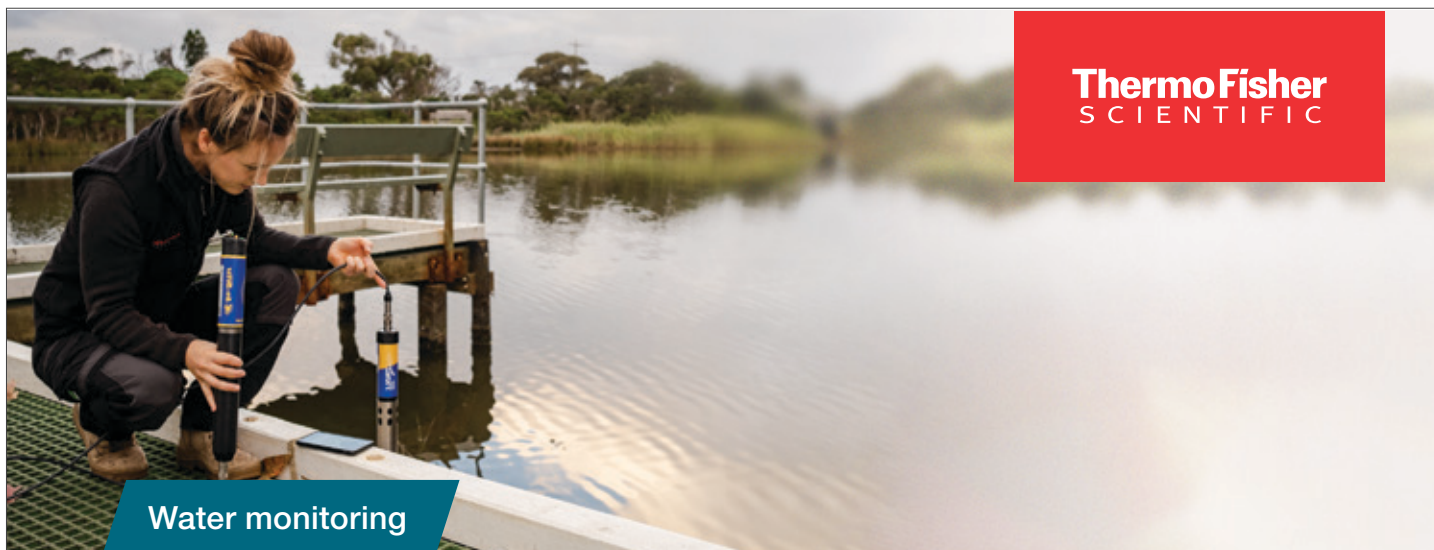
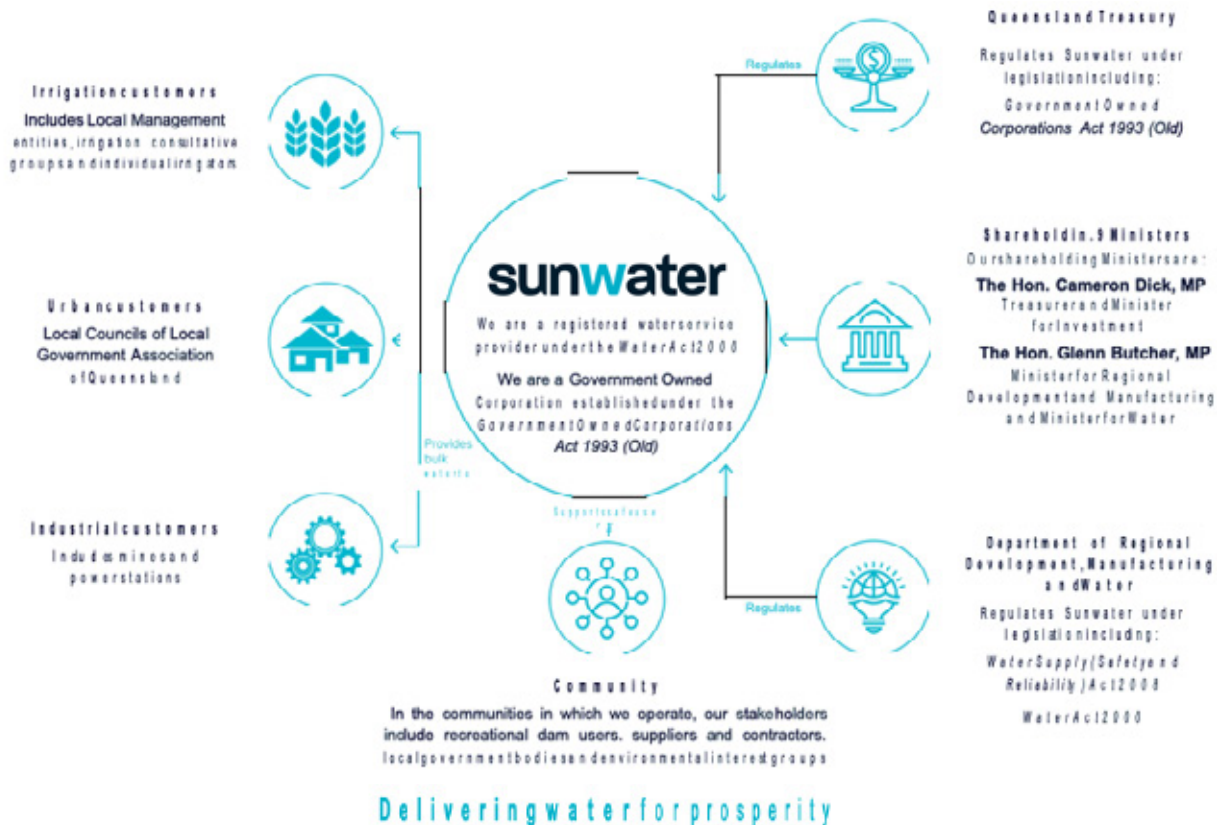
### Telstra 4G and satellite options

Moving towards July 2024:

- 3G shutdown in July 2024
- what will the Telstra 4G reception be like in remote locations – maybe resort to NB-IoT or Cat M1
- Sunwater currently rolling out 4G modems
  - work orders on schemes to upgrade the solar panels, regulators and batteries
- Utilising satellite options where mobile reception is limited
- Piggy-back off non-Hydrographic Sunwater infrastructure to enable primary or redundant communications. An improving telemetry network and available hardware devices.
- There are a multitude of ever-improving devices and mobile and satellite networks
  - For example, 5G roll out, Swarm IoT (<https://swarm.space/>) or Myriota IoT (<https://myriota.com/>) satellites
- Telemetry innovations will be tested and implemented by other organisations, so hopefully we can learn from other's successes/problems

Sunwater will review and implement improvements to its telemetry systems, creating a resilient, reliable and robust data network for successful flood awareness and water delivery operations.



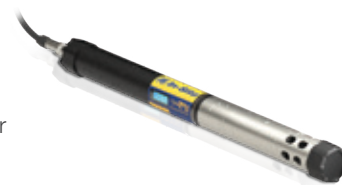


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Water monitoring

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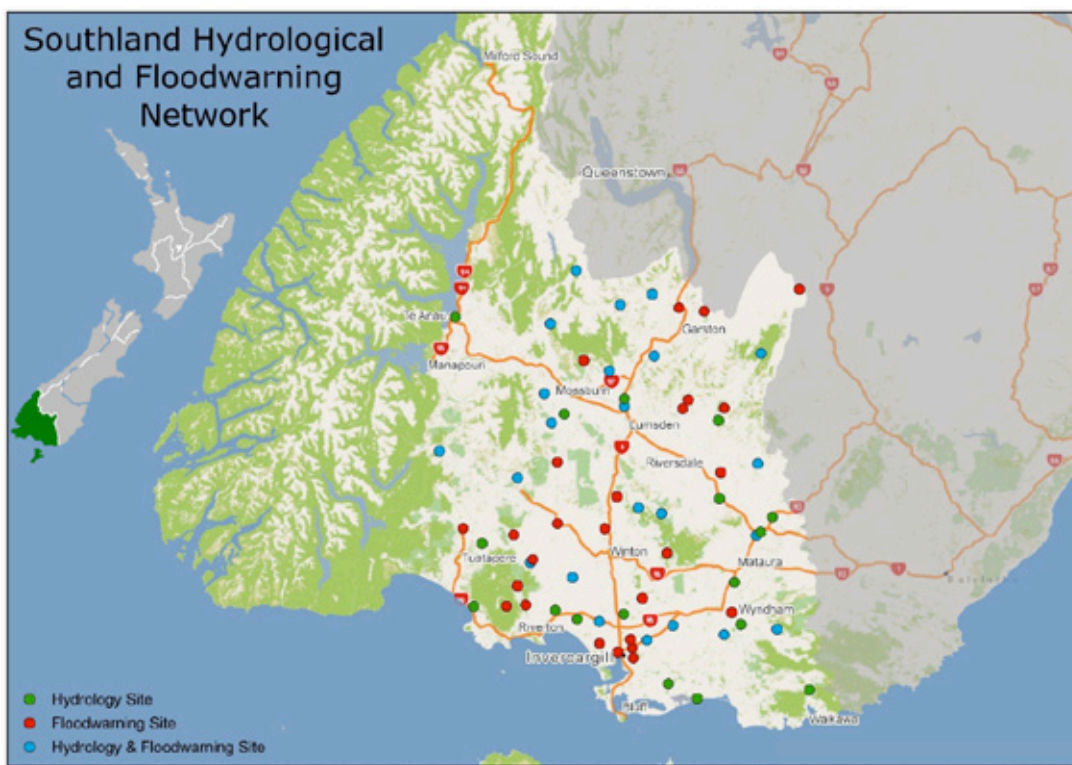


# Image Velocimetry and Adapting Media Capture

Presentation from the AHA Conference 2023.  
Michael McDonald – Hydrologist (Environment Southland)

## River Network

- 66 Sites
- 26 Flood Warning Only 17 Hydrology Only
- 23 Shared Sites



## Training Through the NZHS



## Why Surface Velocimetry?

- Staff Safety
- Stage to Flow
  - Assist station development
  - Rating drift
  - Target gaps in rating curves
  - Capture the entire event
- Other Benefits
  - Ability to prioritise work
  - Media for communications team
  - Flood warning





## Sites and Hardware

- Current 3D Fixed Camera Sites
  - Waikaia River at Piano Flat
  - Waikaka Stream at Hamilton Park
- Drone Use
  - When suitable
- Surface Velocity Radar
- Early Sites
  - Hedgehope Stream
  - Makarewa River \*



## Docking Station



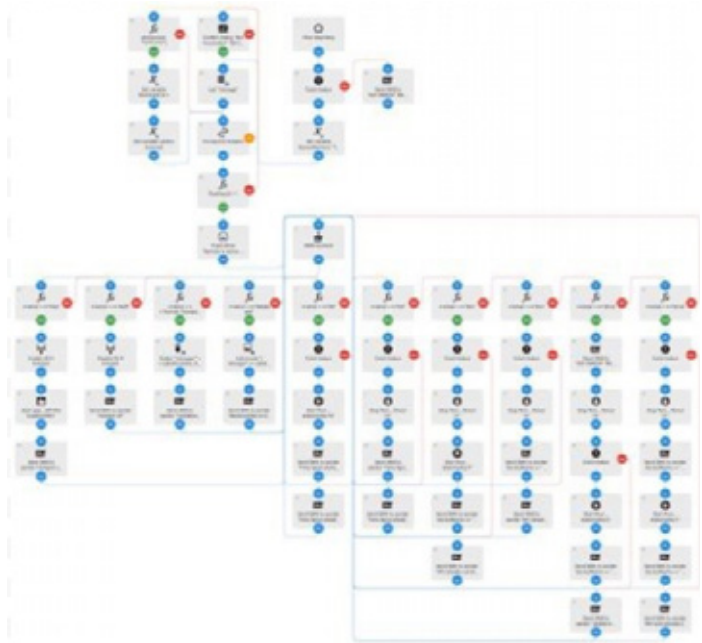
## Remote Image Velocimetry

- Hardware Cost
  - ~\$250
- Sim and Data
- Power
  - ~9mA / 0.11W Standby
  - ~200mA / 2.5W in use

Solar charge controller	\$5.80
Solar panel	\$ 28.90
Sd card (128g)	\$ 72.00
DC-DC regulator	\$ 7.60
Waterproof box	\$ 47.40
Damaged phone	\$ -
6v battery	\$ 86.60
<b>Total</b>	<b>\$ 248.40</b>

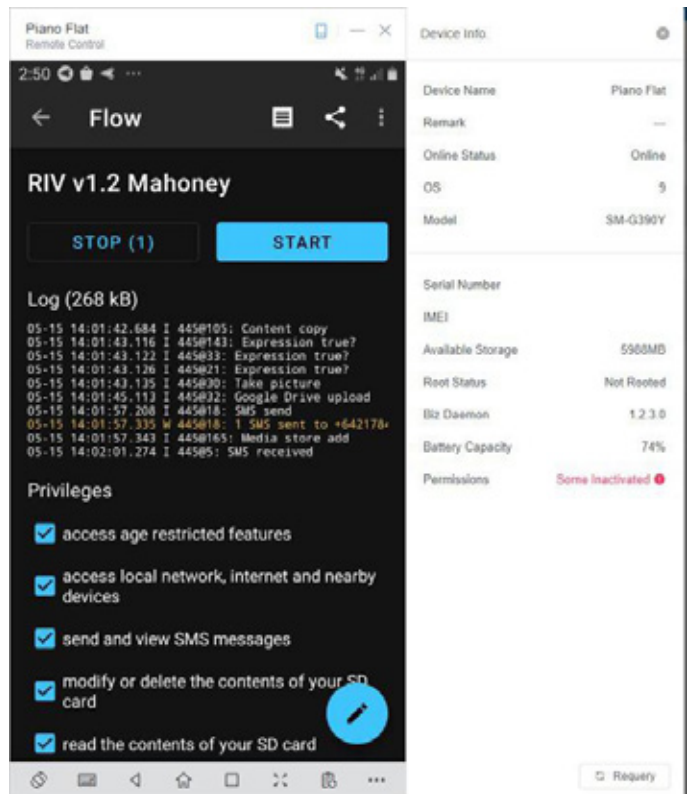
## Automate App

- Android Application
- Actions Event Triggers
  - SMS
  - Time



## Current Actions

- SMS Activated Actions
  - Media to internal or SD card
    - > 4 x 30 second video over 12 minutes
    - > Individual video and photos
  - Upload footage to cloud storage
  - Local hotspot to download data
  - Offline event
  - External triggers
- Other Apps
  - WiFi File Explorer
  - Airdroid
  - IPC apps with RTSP





## Waikaia Fixed Camera

- Location
  - 144km from our office
  - Access cut-off frequently
- Rate of Rise
  - Challenging to time site visits
- Gaps in Rating Curve
  - Wading limit of ~13m<sup>3</sup>/s
  - Limited high flow data
- Stable Section

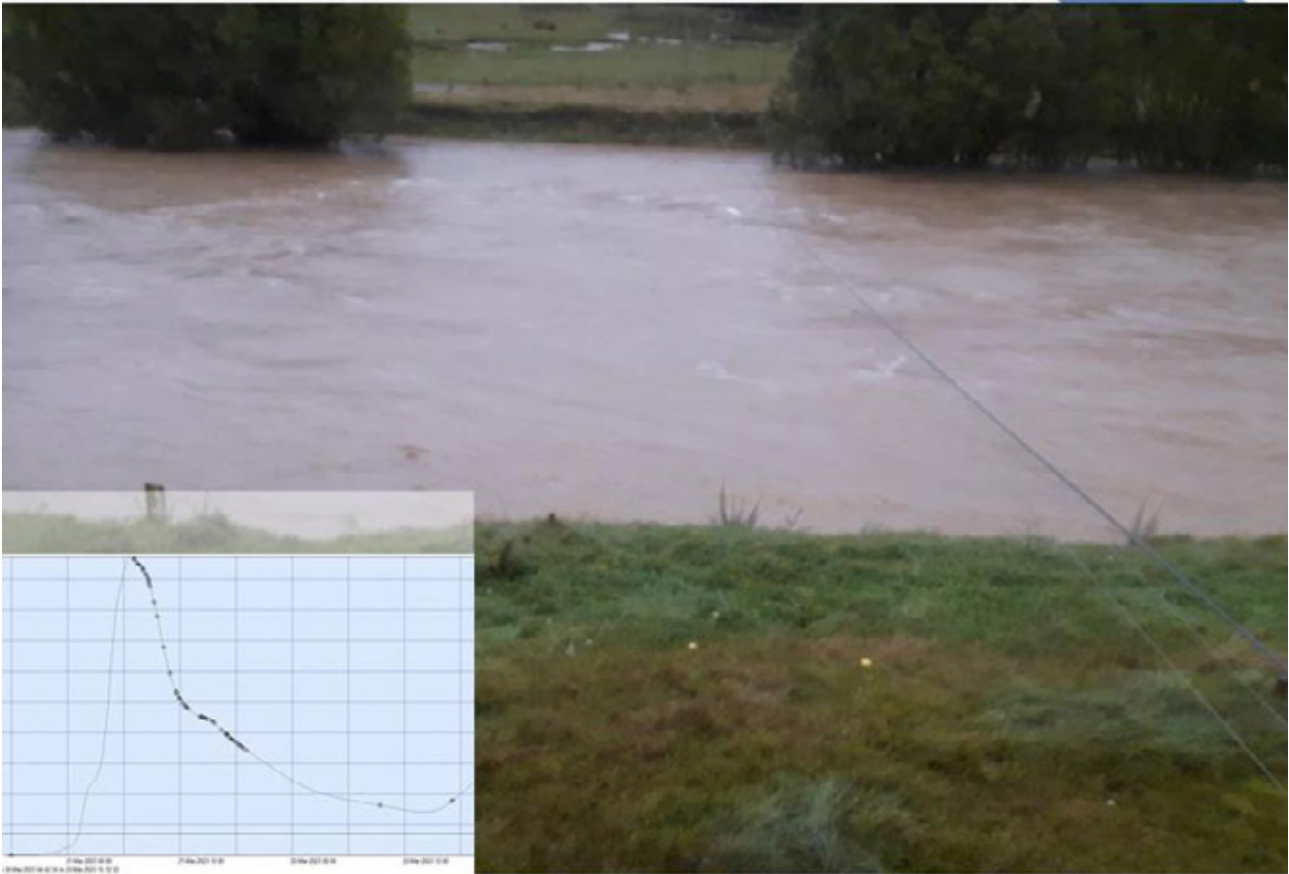


## Site Access



Waikaia River at Piano Flat





21/03/2023 @ 07:05am



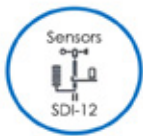
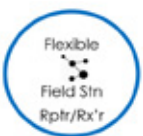
**AQUAMONIX**  
SOLUTIONS

# ALERT2 Evolution

Aquamonix & ELPRO have been busy working on the new ALERT2 products and were recently awarded the Bureau of Meteorology National Flood Warning Network Installation.

The ALERT2 hardware sets a new benchmark for remote monitoring. The rollout has begun with a number of councils and utilities starting to future-proof their networks.

## Features At A Glance:



Envirada Industry Leading Brands

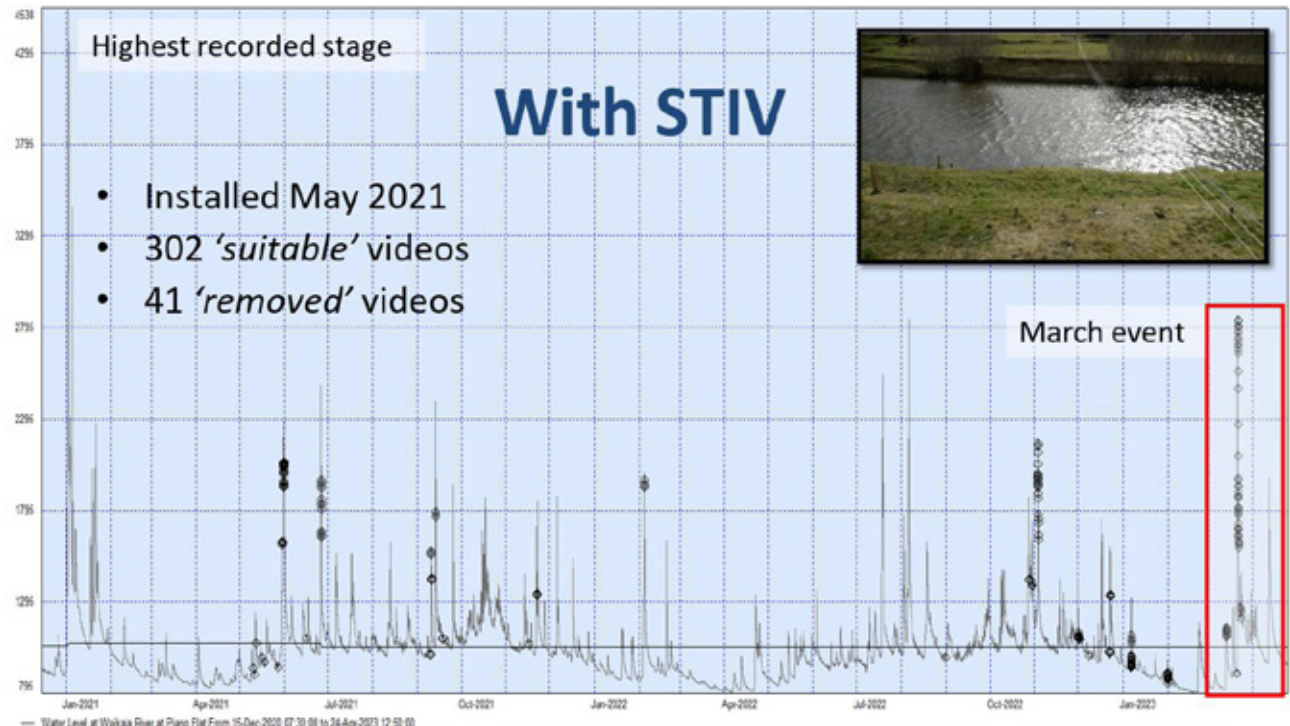
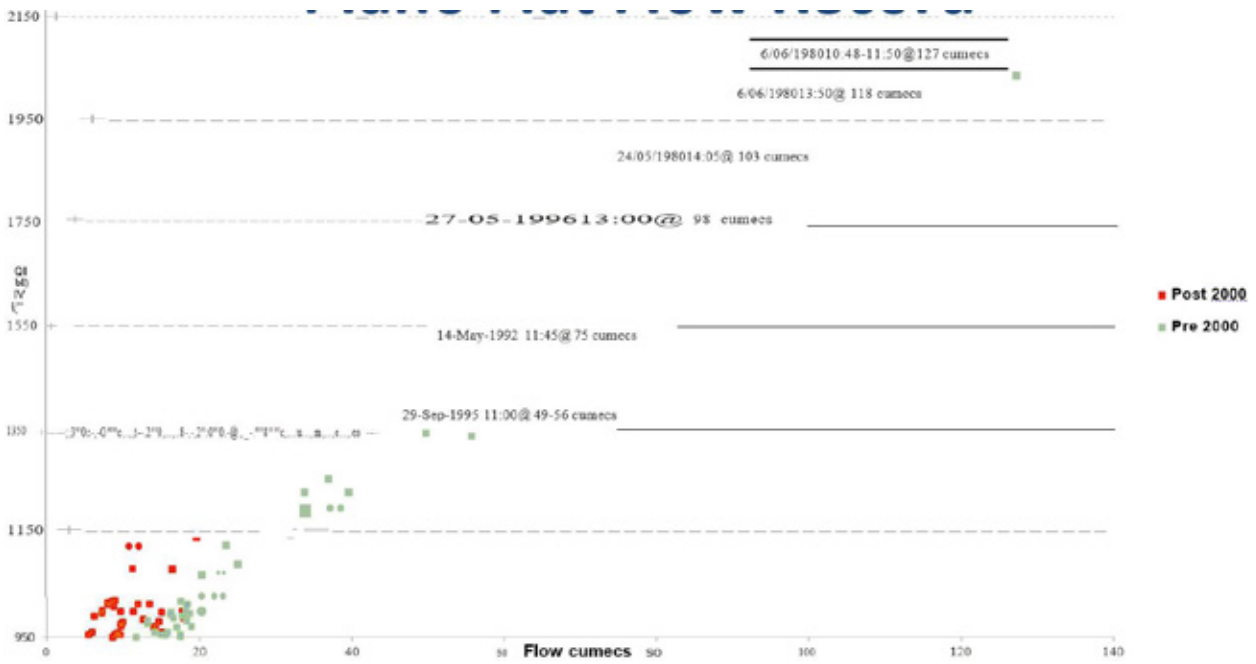


For more information contact Aquamonix at [sales@aquamonix.com.au](mailto:sales@aquamonix.com.au) & follow us on LinkedIn.

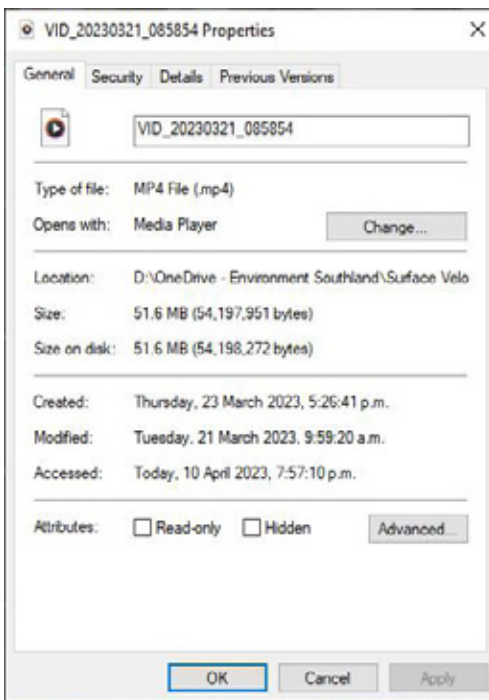
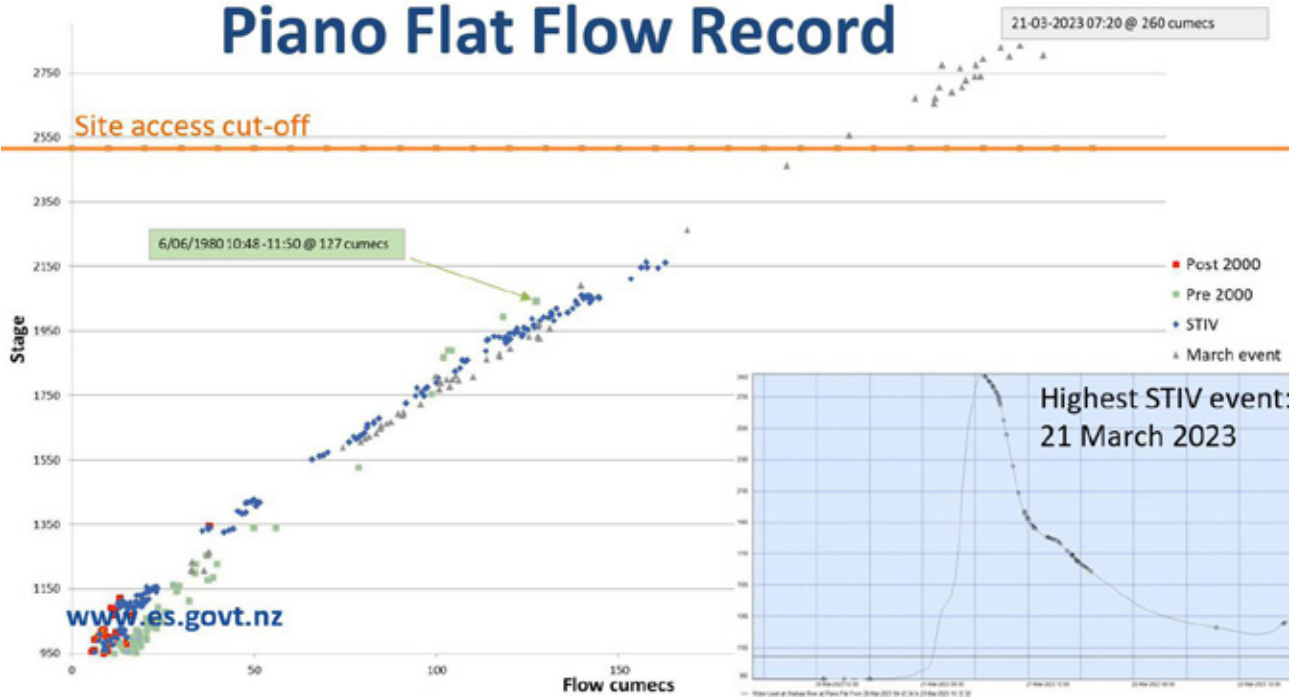
*Measure Monitor Master*



# Piano Flat Flow Record



# Piano Flat Flow Record



## Our range of solutions for the flood warning market include:

- Solutions for basic and advanced applications
- Turn-key canister and backplane ALERT and ALERT2 systems
- System components for custom ALERT system deployment



To find the best flood warning solution for your needs, visit [www.campbellsci.com.au/flood-warning](http://www.campbellsci.com.au/flood-warning).

## Key Learning's

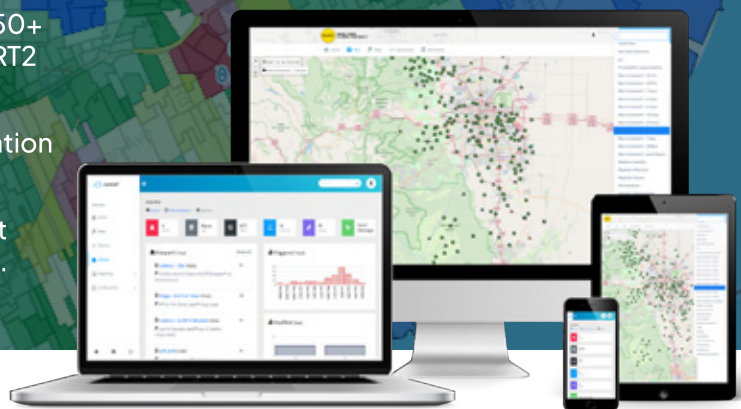
- Name media by date/time
- Review media
- Windows photos
- Metadata tool to pull stage
- Plan flow targets





Contrail® software brings all your water, rainfall, and environmental-related data together in one place.

- Automates real-time data collection, validation, analysis, and archiving.
- Integrates many sensor types, and 50+ source types, including ALERT/ALERT2 and many others.
- Presents up-to-the minute visualisation of current conditions.
- Delivers user-definable alarms, alert rules, and notification management.



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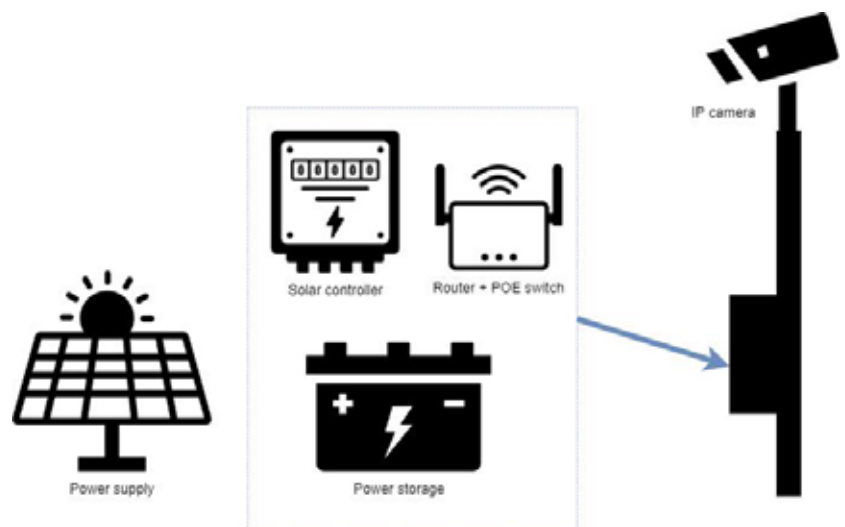
## Data to Life

- Objective
  - Bring data to life by enabling the community to view environmental data alongside (near) real-time imagery collected by onsite, automated cameras.
- Sites
  - Oreti River at Lumsden
  - Waihopai River at Dam
  - Mataura River at Gore
  - Oreti River at Three Kings
  - Mataura River at Parawa



## Network Requirements

- Ease of use
- Maintenance
- Scalability
- Hardware compatibility
- Multi-project
- Privacy requirements



## Current Network Setup

- Media Retrieval
  - RTSP, API or snapshot
  - Python
  - External media
- Video Management Software
  - Standard output
- Edge Storage
  - SD card as backup



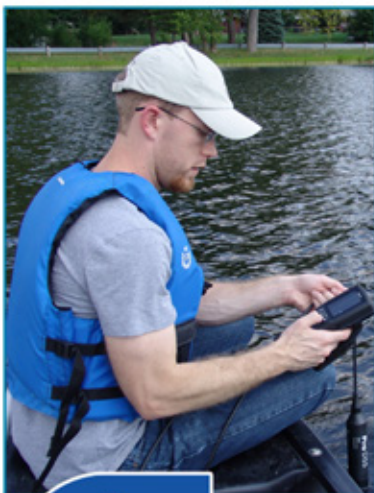


## Adapting to Challenges

- Changing Requirements
  - Data to Life, Surface Velocimetry, Flood use?
- Communications Network
  - Image frequency and quality?
  - Usage and Analytics ?
- Power
  - Cellular, satellite, dual networks?
  - Backup: Server/edge storage?
  - Mains, solar or combined?
  - Run time?



## Our Capabilities: Leaders in Water Quality, Flow & Discharge Instruments



### Water Quality Monitoring

YSI handheld instruments and Sondes are used to collect water quality data **across the globe**.

### Water Movement - Currents, Waves & Flow

Xylem's portfolio includes instruments that can measure the movement of water in streams, rivers, lakes and **even the depths of the ocean**.









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right partner.

# Hydrographic Careers at ALS

ALS has the biggest contingent of Hydrographers in Australia. We operate many long-term contracts for major Water Authorities as well as a diverse list of Government and private sector clients. If you're after a career in Hydrography while working with a dynamic team, ALS is your destination.

## What ALS offers

- ▶ A safety-first approach
- ▶ The largest employer of Hydrographers in Australia offering room for advancement in varied career paths across the following groups: field hydrology, international projects, data management, instrumentation, and systems in 16 office locations across Australia allowing for voluntary relocation and Management opportunities
- ▶ Industry approved Enterprise Agreement with guaranteed annual salary increments and above market pay rates
- ▶ Sponsored certification and membership of the Australian Hydrographic Association and free enrolment for the AHA Diploma Water Industry Operations (Hydrometric Monitoring)
- ▶ Strong R&D Focus allowing for exposure to technological advancements including Photogrammetry/STIV, remote control boats, acoustic dopplers, iPhone app and sonar
- ▶ Field work encompassing working above the snow line, 4WD'ing in isolated areas, kayaking on rivers, hiking, working from boats, and operating drones
- ▶ Providing awareness in the education system through work experience placements and internships

If you are keen for a challenge while working alongside the best staff in the industry in a very dynamic company, contact us via email [hydrographics@alsglobal.com](mailto:hydrographics@alsglobal.com)



# Jet Ski Gauging's – Our Findings

Presentation from the AHA Conference 2023.

Tane McFadden – Hydrologist (Waikato Regional Council)

[Link to Video](#)



## Our Mission

- Gain more control over gaugings.
- Target rating gaps reactively.
- More confidence when changing the rating.
- Carry out this work in-house.
- The ability to capture flood events.

## Our Decision

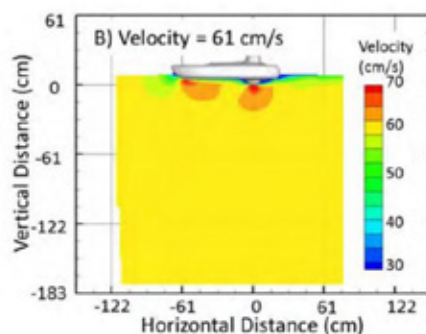
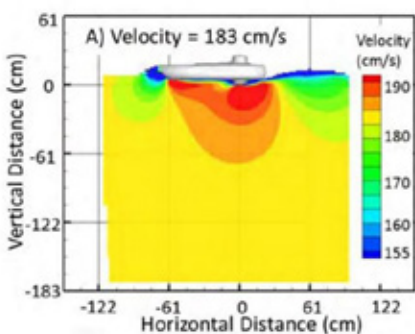
- Experiment with a jet ski.
- Save costs and remain available.
- Out-source air quality.
- Increasing our team's capacity.

## The ADCP Mount

- Safety (sensor/people)
- Vessel control
- Side mounted ADCP
- Accessibility

## Water Displacement and Velocity


- Larger water displacement from the jet ski
- We don't yet know the extent of the velocity change caused by the jet ski water displacement
- Our solution is to lower the transducer depth




# FLOW MONITORING SIMPLIFIED

Measure depth and velocity in open channels or pipes with the MACE Doppler Ultrasonic Area/Velocity Sensor. Installs in minutes and features a low-profile design to avoid fouling.

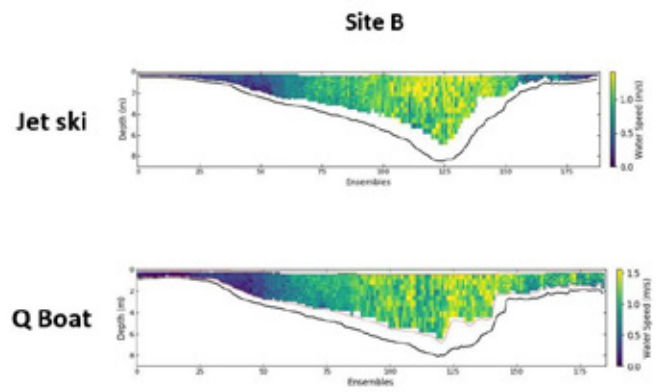
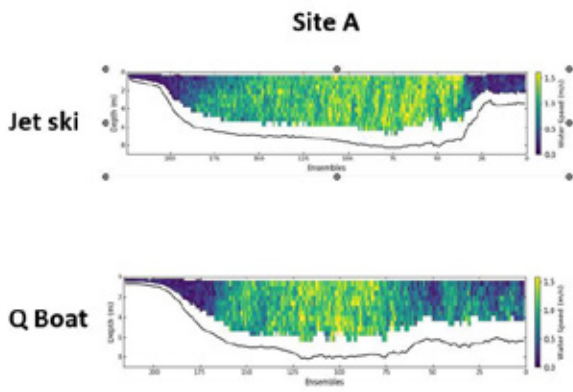
Learn more at: [in-situ.com/a.v.sensor](https://in-situ.com/a.v.sensor)

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## Data Comparison



## Course Made Good (Bearings)

### Site A

Starting bank	Jet Ski	Q Boat
Left	56.41°, 56.41°	54.84°, 55.16°
Right	236.56°, 235.92°	238.99°, 233.85°

### Site B

Starting bank	Jet ski	Q Boat
Left	52.29°, 55.09°	57.25°, 57.46°
Right	231.99°, 233.4°	232.69°, 232.51°

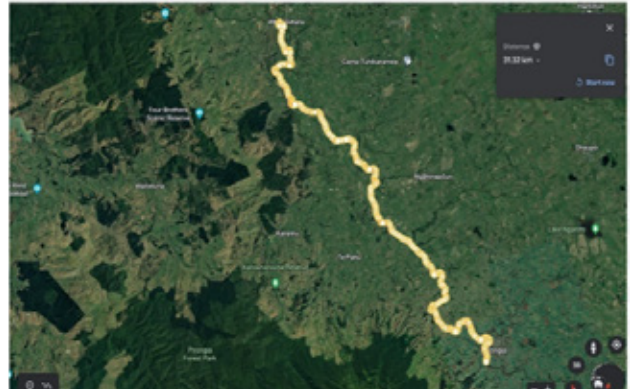
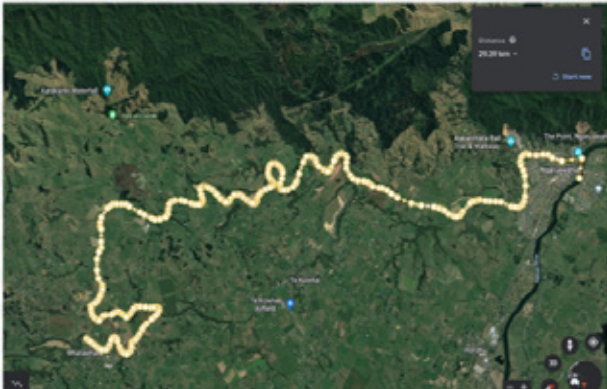
## Ski Data – Consistent

	Jet ski		Q Boat	
	Total Q (m3/s)	Rating deviation (%)	Total Q (m3/s)	Rating deviation (%)
Site A	260.939	2.6	254.938	8.7
Site B	260.338	2.4	276.549	0.2

Data variance hypothesis:

- Q Boat edge distance more difficult to estimate (opposite side of river).
- Jet ski edge distance is far more accurate (especially on large rivers).
- Improving confidence in our measurements.
- Control over gauging vessel (deployment platform).

Data variance hypothesis:



### Data Management Services

After more than 35 years as a Field Hydrographer in Australia and 16 years running an environmental monitoring business for the mining, industrial, and government sectors, it is time for a change of focus. Time-series data management, analysis, and validation has always formed an integral part of what we do at EnvironMine Data Services. And more than that, it has always been a personal passion of mine throughout my career.

It is now time to step away from the field aspects of our profession and focus instead on data management as a primary service. As an expert user of Hydstra, the de-facto standard database for our State water authorities and the Bureau of Meteorology, I am well experienced and equipped to assist clients who may not have the time or the in-house resources to do it all themselves. Services can include but not be limited to the following: -

- Managing time-series data from a wide range of sources including water level, stream flow, water quality, rainfall, weather, dust, etc.;
- Data import, processing, QA/QC validation, export;
- Data reporting, and analysis;
- Web data hosting.

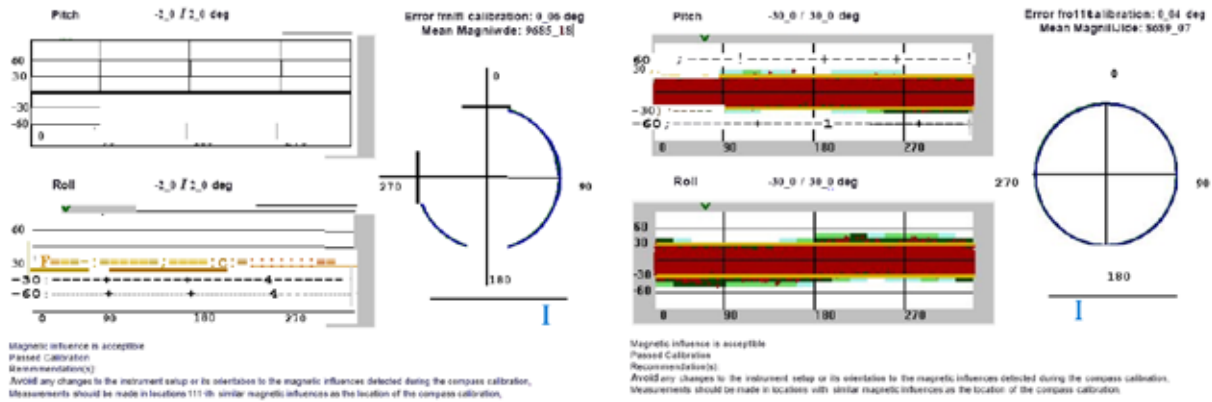
Please feel free to contact Steve should you wish to discuss our data management services:

Steve Orr  
Principal Hydrographer  
EnvironMine Data Services  
Mob: 0448 666487  
Email: [sorr@environmine.com.au](mailto:sorr@environmine.com.au)





## Compass Calibrations



## Jet Ski on River for Gauging Multiple Sites

### Advantages:

- Reduces set-up time at sites
- Fuel efficiencies
- Weather dependant
- Access sites without boat ramps

## Conclusion

- Gain more control over gaugings
- Target rating gaps more reactively
- Carry out this work in-house
- Confident in our data
- Saving costs and increased our team's capacity
- Improving our data gathering

# Modular IoT Integrated Systems

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