

# Australasian Hydrographer **March 2015**



**AHA****Australian Hydrographers Association**

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**Material Submitted**

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# Contents

Editor's Introduction	3
AHA 2014 Conference	4
AHA Training and Qualifications Update	6
The Operation of the AHA is Changing	10
A New Constitution and a New Committee Structure	10
Outsourcing the Association's Workload	11
Funding the Outsourced Workload	11
The Future AHA	12
AHA Member Profile - Bill Steen	13
AHA Member Profile - John Cameron	15
Pilbara Region River Pool Bathymetry	17
When is a Measured Difference an "Error"?	23
Stanley Mort and His Pluviometer	24
Remote High Flow Measurement	26
In Memoriam	30
Mik Sievers	30
Doug Thatcher	30
Wayne Davies	30

**FRANK DAVIES**

## Editor's Introduction

I know. It has been a long time between journal issues. Planning was commenced for one to occur last December, but with such a short time since the 2014 conference, which I understand was very successful, then the holiday season taking over, it was decided to delay production until now. The frequency of the journal is intended to be quarterly unless significant events occur.

Some introductory comments follow regarding this issue's content.

With the help of the AHA Committee members I have collated some of the many changes that have been occurring in the association over the past couple of years or so in "The operation of the AHA". My intention was to highlight the progress that has been made to ensure that the association is able to provide a valued service to its members well into the future.

There are two more hydrographic profiles for you to enjoy; AHA Association President Bill Steen, and Victoria's John Cameron. I would be pleased to receive further nominations for hydrographic profiles. Don't be deterred by the age of the recent candidates. Profiles of younger hydrographers of any gender or background would be appreciated.

I'm sure you will enjoy the words provided by Ash Ramsay and Rob Gibbs. It provides a classic example of hydrographic life, combining the collection of scientific information about water whilst at the same time enjoying a lifetime experience. The work they performed is not traditional hydrography, but it shows how hydrographic skills can be utilised to satisfy related demands for data about water. Those that read the WA Department of Water's newsletter will recognise the tale, and I thank the Department again for allowing it to be reproduced in the journal.

Glenn McDermott provides us with another challenge to quantify the measurement of water flow using statistics.

Ray Alford's history of the Mort pluviograph will trigger some (older) people's memories. Ray says: "I feel that it is worthwhile to try and preserve some of the history of our early equipment, especially when it was made and designed in Australia. With any luck, others might be inspired to document some of our hydrographic history... If anyone has any more details about the Mort, I'd appreciate if you could pass them on."

The final technical article by Mark Randall demonstrates how hydrographers and equipment suppliers can cooperate to improve the industry. Mark liaised closely with equipment supplier UVS who not only provided equipment alternatives, but also accompanied Mark and his team into the steamy north of Queensland to install the product - a great result.

If some of the content in this journal inspires you to consider writing your own contribution, then don't wait until the next call for articles. Put some notes together now and send them through. The profession of hydrography has always benefited by learning from other's experiences.

# AHA 2014 Conference

**Natalie Noakes**  
**Conference Convenors Chair**

On behalf of the AHA Committee and the Conference Convenors I would like to thank all presenters and poster paper authors for their effort. We understand the large amount of work load and time that goes into developing presentations of such high quality. The papers written to accompany the posters and presentations were also of a very high calibre. Versions of these documents will eventually be made available to the general hydrographic community either on the AHA web site or in the AHA Journal. This will help continue to add knowledge base and experience to the hydrographic industry.

There were also many unsuccessful conference paper submissions. Be assured that your efforts were also highly regarded by the convenors and I encourage you to offer your work for publication in other mediums such as the AHA Journal.

I would also like to thank those who travelled far and internationally to attend the conference and the Keynote Presenters who spoke as experts in their field.

Conferences would also not be a success without all the other attendees, be they individuals, organisational representatives or industry representatives and sponsors. A total of 190 people attended the conference.

The 2014 conference was undoubtedly a huge success, particularly due to the very high quality of the presentations and posters. It underlines the importance of AHA Conferences in providing a platform where hydrographers can network, share industry knowledge, learn more about their profession and discover new products and new ideas.

Without this sharing of knowledge, the industry would fail to grow and develop better quality data and data collection techniques and methods.

We hope to see you all again at the 2016 AHA Conference.





# AHA Training and Qualifications Update

*Paul Langshaw*  
*AHA National Training Manager*

## New Training Provider

Recently AHA and Canberra Institute of Technology entered into a Service Agreement to deliver qualifications within the National Water Industry Training Package. i.e. Diploma Water Operations to Hydrography students.

Both parties are very confident this partnership will benefit the students and our industry as a whole and is more significant since OTEN's decision to back away from delivering this qualification from the end of the last semester of 2014.

CIT has previously advised that students can enrol in the Diploma – Water Operations (Hydrography) for the first semester of 2015. We are currently liaising with them to enable this to occur. As soon as advice is provided as to how students can complete their enrolment we will make an announcement to the membership.

## Core Units

The way the model works is that, after enrolment with CIT, CIT will offer delivery of the two core units. i.e. Environmental Management (NWP 505B) and Occupational Health and Safety (PSPSOHS501A) by distance learning.

## Elective Technical Units

The remaining 5 (elective) technical units will be offered by AHA via either distance learning or face to face (Note: F to F classes of 10 or more students).

- The cost per unit for each of the 2 core units will be \$500.00/unit (no GST).
- The cost of each elective/technical unit delivered by AHA via distance learning will be \$500.00 + GST/unit (payable to AHA).
- The cost of each elective/technical unit delivered by AHA via face to face will be \$1,500.00 + GST/unit. The duration of each face to face unit is 3 days.

## Hydrography Basics

AHA is continuing to deliver face to face courses in Hydrography Basics. This course is aimed at new starters to the industry, providing an introduction to the key elements of hydrography. Its aim is to supplement on the job learning, raise awareness of principal field activities undertaken by hydrographers, and inform how these activities relate to broader objectives. Graduates of the Hydrography Basics course will learn key skill sets quicker than they would from on the job learning, gain an understanding of the theoretical background, and be more productive in the field in a shorter time frame. On completion they will also be eligible for registration as a Certified Cadet Hydrographer. Also, the Hydrography Basics course provides some recognition of prior learning towards the Diploma - Water Operations if enrolled through CIT.

## National Water Industry Training Package

The AHA, at the request of Government Skills Australia, assembled a Technical Reference Group to provide industry input into the streamlining of the National Water Industry Training Package.

This project is now completed and hopefully will be endorsed by mid-2015. What this means to hydrography students is that there will be Certificate III, Certificate IV and Diploma level qualifications, thus providing a more structured career path.

## A Seamless Pathway

The AHA is working with CIT to ensure a seamless pathway to the new packaging rules and will relay the course structures to members when they are finalised.

Finally, if students or managers require further information on any of the above items please do not hesitate to contact me.

### **Paul Langshaw**

AHA National Training Manager

Ph: 0419 266 299

E: [training \[at\] aha.net.au](mailto:training@aha.net.au)



# MF pro

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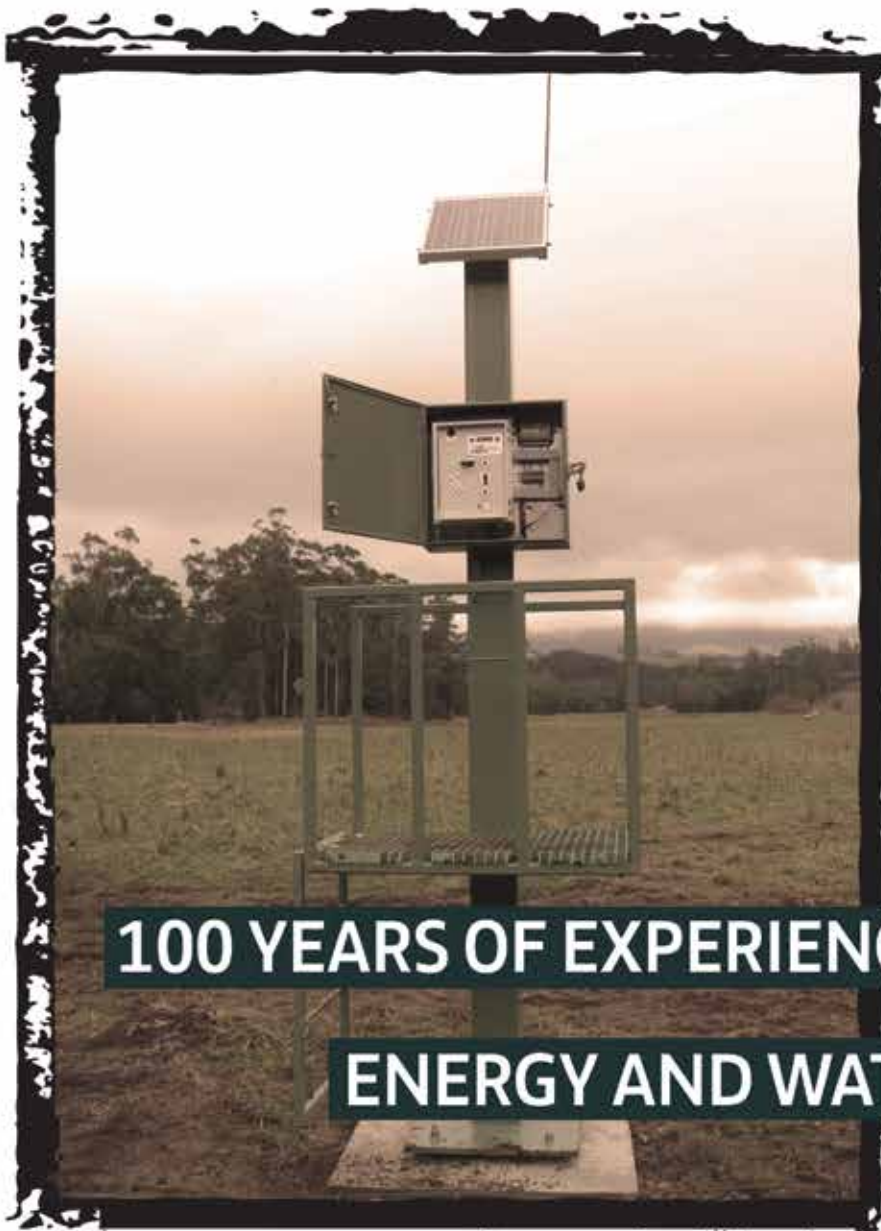
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# The Operation of the AHA is Changing

*Editor, with input from the AHA Committee*

If you are one of the many members who take just a passing interest in your association, then you may be unaware of some of the changes that are occurring in the way the AHA operates. Some of these changes have been announced via the eNews, Committee meetings and at Annual General Meetings. However, you should be more informed about others. The information presented below is intended to recap what has evolved over the past few years and what it means for the future.

## A new constitution and a new committee structure

A new constitution was adopted at the 2013 AGM. This was initiated to ensure that the association conformed to the NSW Associations Incorporated Act 2009. (The AHA is incorporated in NSW.) One of the requirements of the new constitution was a modified committee structure. The AHA Committee now consists of:

- An executive (or office-bearers) of four comprising:
  - President (previously Chairman).
  - Vice President (a new position).
  - Secretary (unchanged).
  - Treasurer (unchanged).
- Six ordinary members (an increase of two).

Within the Committee there are currently two portfolios:

- Training - Paul Langshaw.
- Publicity - Grant Robinson.

The Committee has also approved position descriptions for each member. These are “living” documents and may be reviewed to meet future requirements. If you haven’t already, it is worth having a read of these. At the front of each description are the anticipated workloads for each ranging from 5 to 15 hours per month. These values take into account the outsourcing support described in the following section.

The transition from the old to new constitution was finalised at the 2014 AGM when motions were passed to define the cycle of elections of the ten committee members; five each year, to ensure that not all the committee is replaced in any one year. Elections were subsequently held and the appointments of Paul Langshaw as Vice President and Krystal Hoult as Secretary were completed, both unopposed. At the same meeting Jacquie Bellhouse and Harrison Schofield were elected as the additional two committee members. All other sitting committee members continued in their positions.

The constitutional changes have thus precipitated both role and functional changes for the committee, even though the eight previous committee members remain.

The AHA Constitution, Committee details and position descriptions can be accessed from the “About AHA” link on the AHA website ([aha.net.au](http://aha.net.au))

## Outsourcing the Association's workload

All of the AHA committee member positions are currently voluntary. From the nominal workloads mentioned above, an effective committee requires a considerable workload. Take, for example, 15 hours per month. That is 180 hours per year, or an extra month or more of work. This aspect has been partly responsible for the level of the operation of the AHA throughout its history, with spurts of progress followed by lulls that at one stage sent the association into hibernation for many years.

You also have to consider the type of people who are elected to the AHA Committee. Primarily they are hydrographers! Yet, much of the committee's work is not hydrography. It is therefore logical that this work could also be performed more efficiently by people or organisations with expertise in given areas.

Opportunities to outsource the Association's workload have been progressively adopted. The Association started working with Canberra based National Promotions in 2007 prior to the 2008 AHA conference. For that event the AHA considered other event management companies, as well as venues, costs, location, etc. before choosing National Promotions. Terms of rates, amount of work involved and the return back to the AHA were all part of the negotiations. As with any business relationship, the AHA Committee saw benefits in working closely with National Promotions. With their assistance since then the biennial AHA conferences have been far more professionally presented, and this is reflected in the support from trade, which relates directly to the revenue returns back to the AHA.

From an administration level, the relationship with National Promotions has led to them gaining a good understanding of the Association's needs. They have thus been able to advise the Committee on how to run the Association in a more professional manner, which hopefully reflects in the benefits to members. The announcement at the 2014 AGM that National Promotions would provide the customer relationship management for the Association is the latest stage of developments. This role encompasses the activities of association management, membership, publicity and communications, and training. Even the last few years of the *Australasian Hydrographer* have been professionally published by National Promotions. The position description for the [AHA National Office](#) provides a more comprehensive understanding of this support.

There is also a new AHA email contact to service this role: [office \[at\] aha.net.au](mailto:office@aha.net.au).

Committee members are currently undertaking meetings with National Promotions to determine the best ways to take advantage of this facility and ensure tasks continue to be worked on out of session.

## Funding the outsourced workload

Outsourcing the workload obviously comes at a cost, so what are the current fundamentals of the Association's finances?

Prior to National Promotions coming on board, the Committee realised that to raise the profile of the AHA and to provide better services back to the members it needed to:

- lift the profile of the Association and become more proactive in the industry;
- find ways to increase the Association's revenue without impacting on membership costs; and
- develop training material, which in itself was a very large overhead.

The major revenue raising mechanism for the Association is the AHA conference. Prior to 2008, the conference was run purely on a break even basis, with the odd occasion where some profits were returned. Engaging an event management company provided the Association with an avenue to adopt a more professional approach to running the events and the subsequent return. Therefore, the conferences are now the major source of revenue and maintain the Association over a two year period.

The training program is basically self-funding. The Association used some of its funding reserves to provide seed capital to get the initial courses up and running. A typical unit costs between \$15,000 to \$30,000 to be written up and approved for delivery. Multiplying this by eight or nine units and it can be seen that the cost is quite high. However, the Association charges for the running of these courses and the return will be used to fund all future developments.

Membership fees, although handy, are well under that of other professional bodies. The Association has resisted any increases and, without other income sources, it could not survive on memberships alone. It is also an endeavour of the Association to improve the way in which it manages memberships. It is working with National Promotions to implement a system where members can self-manage their memberships and renew online. Anyone who has ever been a treasurer, secretary or membership officer would understand the time and effort required to manage all of these aspects. So the Committee sees this as a huge benefit to itself and members.

Sponsorship is a critical component of the Association's overall operation. It is always under review as to how much value the Association can provide sponsors and how this is reflected in the sponsorship pricing.

### **The future AHA**

What does all this mean for the AHA?

- A more robust operation;
- A more professional organisation;
- Much of the day to day workload of the Committee has been removed; and
- Committee members can operate at a strategic level and thus make progressive decisions.

These initiatives will be more effective if jurisdictions and/or employers continue to support their hydrographic staff with attaining minimum qualification standards (Diploma - Water Operations), involvement in the development of National Industry Guidelines for Hydrometric Monitoring, and attendance and presentations at national forums such as the AHA Conferences.

# AHA Member Profile - Bill Steen

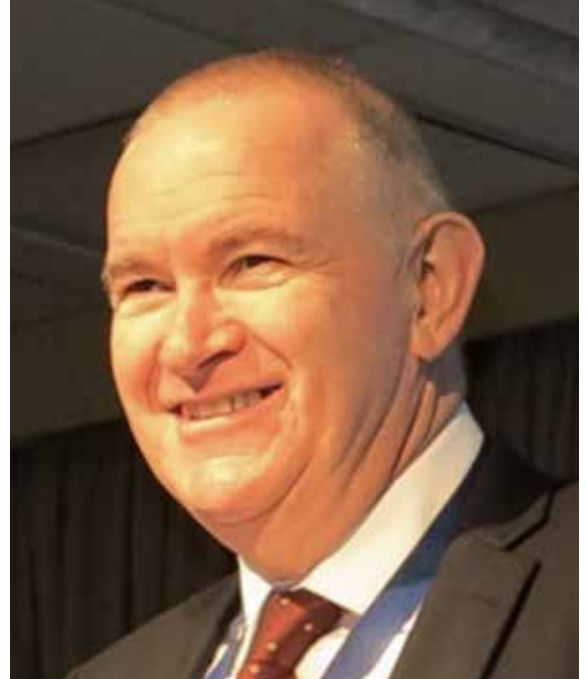
## Describe your current role?

My current role is the General Manager for KISTERS operations within the Australasia region.

## What hydrographic or other qualifications - relevant to your role - do you have?

Whilst working for the NSW Water Conservation and Irrigation Commission (changed soon after I joined to NSW Department of Water Resources, and now NSW Office of Water) in the early 1980s I was undertaking the original Hydrographic Course. I had completed about 80% of this course before I moved to take up a position with the Commonwealth Department of Housing & Construction, Hydrology Section in Canberra in 1986. In order to be recognised as a technical officer (Hydrographer) I undertook and passed the Surface Water Hydrology course.

In terms of other qualifications, I have numerous other minor qualifications in courses that typical hydrographers undertake. In the early 1990s I successfully completed several quality assurance courses including International Auditor.



## What are your major achievements?

In hydrography that is an interesting question. Whilst working in the field I had a lot of satisfying achievements. I remember back in the early 1980s working on a project to evaluate and analyse all the flow measurements taken on the Murray River by three state agencies and account for the discrepancies. This project took months but the result was a standardisation of flow measurements on the Murray.

In terms of the effect on others, I guess the development of the boat and swift water rescue course would be one of my achievements. At the stage when I developed this course there was nothing else on offer. Unfortunately the prompting for this course development was the result of a close working colleague's death during a flood gauging.

Within the AHA, I have been active over many years. However meeting up with Alex Miller and discussing, initiating, and rejuvenating the AHA conferences was an achievement.

Working with the AHA committee over the past 6 to 8 years and getting the AHA training and certification program running, whilst increasing membership and AHA revenues is an achievement I share with the committee.

## Where has hydrography taken you in the world?

It has taken me to about 50 plus countries to be honest! Working for the original Commonwealth Department, and later Ecowise, provided literally a world of travel and a variety of hydrographic experiences. I have very vivid memories of standing on the banks of the Ok Tedi River in PNG and looking across to see primitive tribesman, or visiting a gauging station in Namibia where a lion had recently killed a Zebra beside the recorder hut, or working with hydrographers in Brazil and hearing their stories of how they gauge the Amazon River.

In reality, hydrography has introduced me to a lot of lifelong friends, both here in Australia and overseas.

### **How did your career related to hydrography commence?**

My best mate, Bryan Hall, and I were at school together in Tumut NSW. After completing the Higher School Certificate, Bryan scored a job with the then Water Conservation and Irrigation Commission (currently NSW Office of Water) and I started working for a bank. Bryan would disappear for weeks on end, and then one day I asked what he actually did, his response was "I drive around in a 4WD and finish each day with a few beers". So I thought this was the job for me. Bryan sent me a vacant position advertisement and the rest is history.

### **Was there anyone who had a major influence on your career?**

Obviously Bryan Hall got me into hydrography. I'm not sure if there is one person who influenced my career. Many people at different times of my career have made an impact, such as Len Banks, Bill Barratt, John Skinner, Peter Heweston, and Klaus Kisters to name a few.

Working with a variety of people with various skills and experiences provides the greatest influences on your career.

### **What has been the most memorable experience in your career?**

There have been too many experiences to single one out. This is a very difficult question. I mentioned a few experiences in a previous question. I think in honesty the most memorable would be the people I have met.

### **What makes hydrography interesting?**

The diversity, and this is possibly a more relevant statement today than 36 years ago when I started. Hydrographers today undertake far more diversified projects and to an extent utilise and rely on more technology than we ever dreamt of back in the 1980s and 1990s.

### **What do you do when you are not at work?**

Besides being on the committee of the AHA, I have two other passions; AFL football and motorbike riding. I'm on a committee that works closely with an AFL club and I'm on a committee of a motorbike club. All of these outside activities keep me pretty busy.

### **Where do you see hydrography in 50 years?**

With the way technology is taking over the world I think in 50 years' time we won't recognise hydrography. I believe the need for good hydrometric data will still exist, but how it is collected and disseminated will be a whole new ball game.

# AHA Member Profile - John Cameron

## Describe your current role?

I am currently a Regional Water Monitoring Partnership Coordinator. This is a fairly unique position (there are only two such positions in Australia) and the role is often difficult to explain to people. However, in the mid-1990s the Victorian Government moved to deregulate the Victorian Water industry and as a consequence the, then, Rural Water Corporation (RWC) was divided into a number of statutory water agencies.

Prior to that all surface and groundwater quantitative and qualitative information had been collected and collated by the Hydrographic Section of the RWC. The Hydrographic Section was subsequently sold to private enterprise and now forms part of the Thiess environmental division.

Concurrently it was identified that a cooperative approach to water monitoring was required and alliances were developed between the various water agencies across Victoria to collect high quality, fit for purpose water information that better informed business decisions. This aimed to provide cost effective collection of water information and the sharing of those costs whilst minimising duplication of effort.

Concurrently a state government body was charged with providing the overarching management of the program and it was recognised that coordination would be required between the stakeholders (water agencies) and the service provider. My position evolved from this.

The role provides technical, operational, maintenance and health and safety assistance to the nominated member (often having limited hydrographic knowledge) of each agency whilst supporting and monitoring the Hydrographic providers service delivery and standards.

Victoria has two Coordinators; one servicing the area North, and one servicing the area South of the Great Dividing Range.

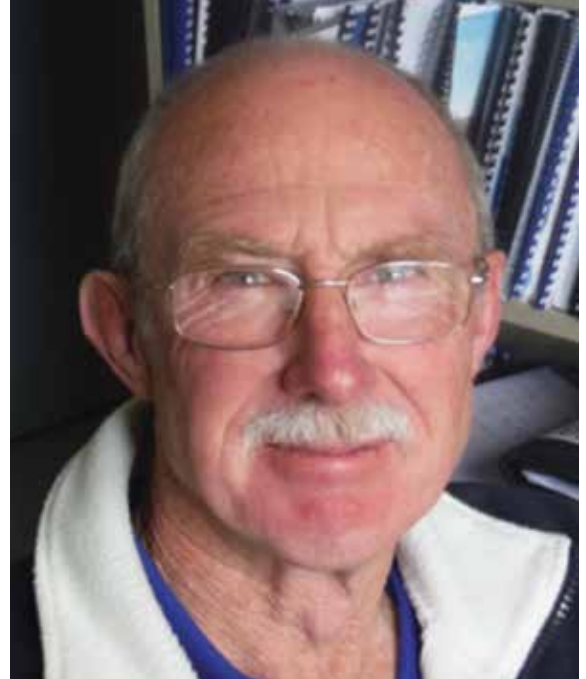
Geographically, the role crosses a large expanse and sometimes requires considerable travel and absence from home but it is extremely rewarding and covers a broad network of interesting, diverse and sometimes demanding stakeholders not to mention the opportunity to interact with all things hydrographic.

## What hydrographic or other qualifications - relevant to your role - do you have?

I hold one of the old Certificate of Hydrography qualifications issued from The University of New England (Armidale NSW) and a Graduate Certificate of Business Administration. In addition I have 12 years' experience managing the operation and maintenance of several high hazard water storages and the subsequent monitoring and routing of floods through them. One flood experienced was the biggest in European history.

## What are your major achievements?

My major achievement is undertaking the role of Victorian Strategic Water Information Coordinator on behalf of the Bureau of Meteorology. This role required the development of a Victorian Strategic Water Information Management Plan that, amongst other things, would guide the Bureau's knowledge and understanding about water information practices in Victoria. Each Australian state was encouraged to produce a similar document that is accessible through the Bureau website.



### **Where has hydrography taken you in the world?**

My entire hydrographic experience has been centred on Victoria but it has been diverse with exposure to five different work regions, management of floods at major storages and working, as a coordinator, with multiple stakeholders.

I have left the hydrographic industry twice but each time have become “home sick” and renewed my association.

### **How did your career related to hydrography commence?**

I commenced my employment in surveying but was eventually offered an opportunity to work temporarily in the hydrographic section. Like many at the time, my immediate response was “What’s hydrographic?” but eventually I took up the offer and never returned to surveying.

### **Was there anyone who had a major influence on your career?**

No single person has had a major influence on my career, however two of my regional managers stand out as giving me unconditional opportunities to prove myself and have concurrently set exemplary standards of integrity and technical hydrographic expertise for me to aspire to.

### **What has been the most memorable experience in your career?**

The most memorable part of my career has been that I have left the industry twice but upon returning have been welcomed back by fellow hydrographers and subsequently my wife and I have formed lifelong friendship with many of them.

### **What makes hydrography interesting?**

Hydrography is an exciting career that offers opportunities to work in some beautiful and remote areas, provides continual challenges and a prerequisite to constantly adapt. Concurrently hydrography in Victoria offers exposure to a diverse network of individuals and stakeholders.

### **What do you do when you are not at work?**

A considerable portion of my leisure time centres around water and the natural environment with interests in fishing, water and snow skiing, scuba diving, hiking, running and sport. Additionally I restore special interest vehicles and travel when possible.

### **Where do you see hydrography in 50 years?**

The only certainty is that hydrography in 50 years will be vastly different to what we know today.

What we know today isn’t anything like what it was 40 years ago when I started. Back then we couldn’t have predicted today’s environment, so I wouldn’t even hazard a guess as to where it may be in 50 years.

# Pilbara Region River Pool Bathymetry

*Rob Gibbs and Ash Ramsay  
Department of Water, WA*



Rob Gibbs and Ash Ramsay bathymetric surveying Chinderwarinner pool, Millstream.

Rob and I have previously worked with the Department of Water's Planning and Allocation Branch performing bathymetric surveys. These were used to determine storage volume to level relationships in self-supply irrigation dams of the south west of WA. These contemporary measurement activities are now being utilised to support a range of department functions from surface water assessment, groundwater assessment, environmental water planning to direct licensing applications for dam volume determination.

Using the SonTek M9 ADP (acoustic doppler profiler) and the HydroSurveyor software we are able to collect very precise geo-referenced bathymetry data on a range of water bodies. This data can then be imported to ArcGis software to develop a digital elevation model and script out a storage volume vs level relationship. In short, we calculate the volume of the water body in question.

After completing a number of these surveys in the south west, our environmental water planning people were very interested in implementing these methodologies to help support some planning recommendations. The Pilbara water plan evaluation process had identified that pool bathymetries were required on all Environmental Water Requirement pools to better understand the interaction between local groundwater levels and pool depths. So, in the first week of June 2014 we undertook the Pilbara river pool bathymetry trip that Rob Gibbs so happily recounts below.

Ash Ramsay and I embarked on a trip to the Pilbara to collect river pool bathymetry data to support environmental water planning. We set out to measure thirteen river pools in ten days, which included the four days travelling from Bunbury and back.

## What we learnt on the trip:

- Ring ahead to see if there is a diesel shortage across Perth.
- 'Easy access' to a water body can mean entirely different things to different people.
- If a 'northerner' casually mentions 'watch out for the spikey bush' investigate this further before setting off on your trip.
- Whatever you don't want covered in red dirt, store in the cabinets rather than uncovered in the boat. Our swags will never be the same again.
- Let fleet care know of your trip because they are tracking your movements.



Starlapse.



Oldman Yinjibarndi.



Millstream National Park.



Millstream Rock Formations.

- Don't rely on text messages for safety checks (or confirm your text was received!).
- Our opinion of 'suitable' launching facilities for a tinny changed as the trip progressed.

We set off from Bunbury with a SonTek M9 – HydroSurveyor, a gauging tinny in tow, a canoe on the roof and enough food to last us for a week. We got north of Perth but couldn't find any diesel so we turned around and drove back towards the city, which was a heartbreaking start to our 'up north' work adventure. Once we managed to find a service station that still had diesel and finally got our chance at the bowser, we filled up the car. Panic was setting in across Perth and lines continued to grow with patrons stressing that the person in front of them was going to suck the last drop of precious diesel, flashes of Mad Max, but we were back on the road and heading to Millstream.

## Millstream

We had scheduled two days to measure five pools at Millstream on the Fortescue River. We started with what we thought was the biggest pool. After canoeing over ten kilometres, then having a quick chat with Millstream ranger Neil, we found out it was actually the second biggest pool so we pencilled in an extra day to complete the sites. By the end of the first evening we had two pool bathymetries in the bank with a total of eighteen kilometres paddled. We were tired but happy with our successful first day. A swag by the fire under the stars would have topped the day off but we settled for a night under the Pilbara sky minus the fire. That night we experienced sub-zero temperatures!

On day two at Millstream we headed to our biggest task, Palm Pool, where we were told there were no suitable launching facilities. As hydrographers it may as well have been a concrete ramp at Hillarys boat harbour. It was ideal! Seeing the boat slide in was a welcome site knowing we had around fifteen kilometres ahead of us. We also towed the canoe so we could survey a smaller downstream pool. Thankfully this pool was much smaller.



The M9 bathymetry rig.



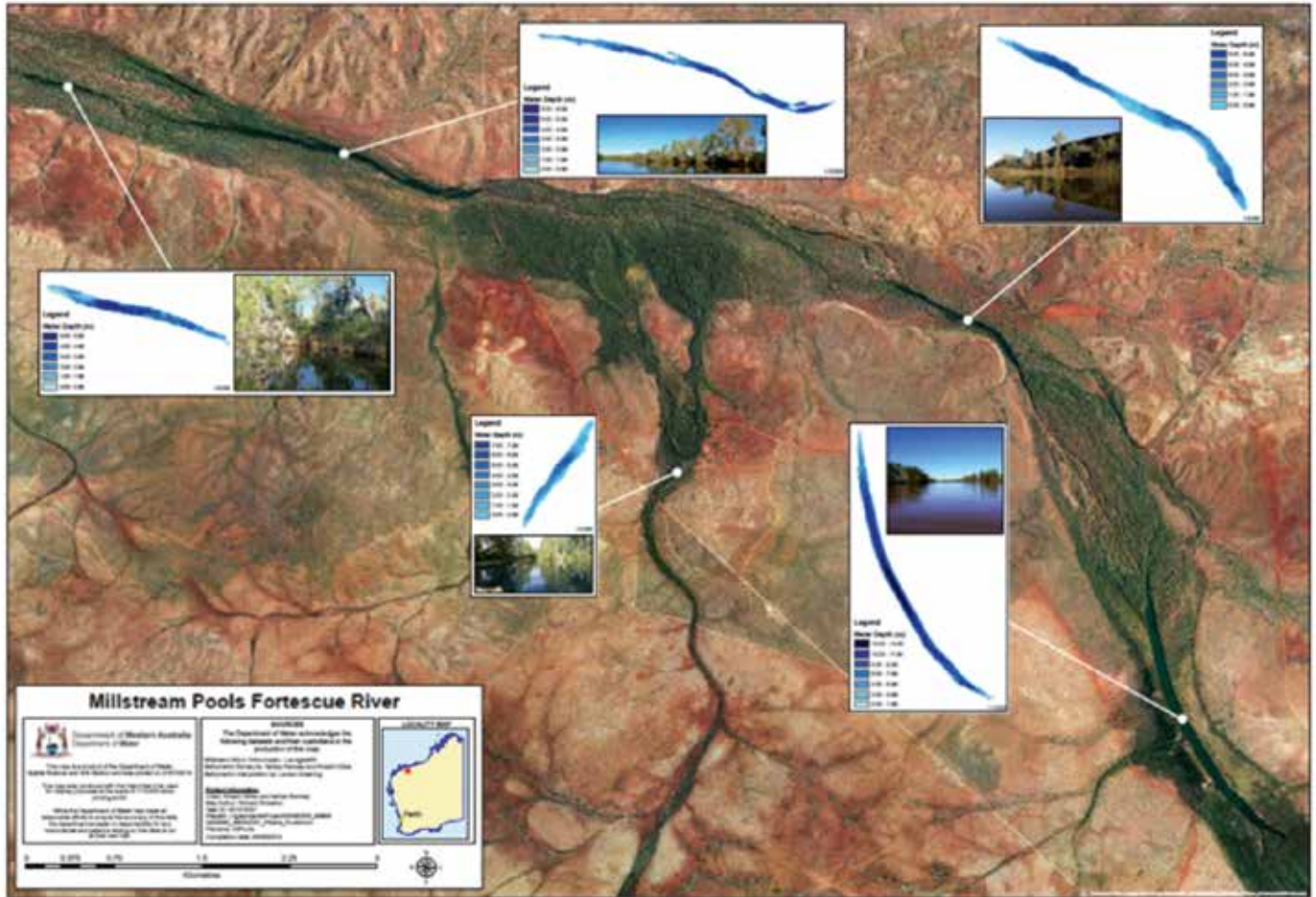
Canoe in tow on Palm Pool.



Getting canoe to Liverstonia Pool.

We left the culturally significant Chinderwarriner Pool until the next day. Chinderwarriner was an amazing pool with crystal clear, warm water. The thick lilies made our bathymetry work challenging but we weaved our way through, packed up our gear and said goodbye to Neil and Millstream.

After a quick stop in Karratha it was off through the beautiful industrial town of Port Hedland and further north to the De Grey River.



The five Millstream river pool bathymetries processed, scripted and mapped.

## De Grey

We pulled into Coolenar camp site that afternoon to decide whether to put our feet up and discuss life with the grey nomads for the evening, or push on and camp on the banks of the De Grey by our first site. We decided to push on as the site didn't look too far away on the map. Fast-forward to 11pm that evening when we called it quits after hours of driving along a 'sort of' track and realising we may have made the wrong decision.

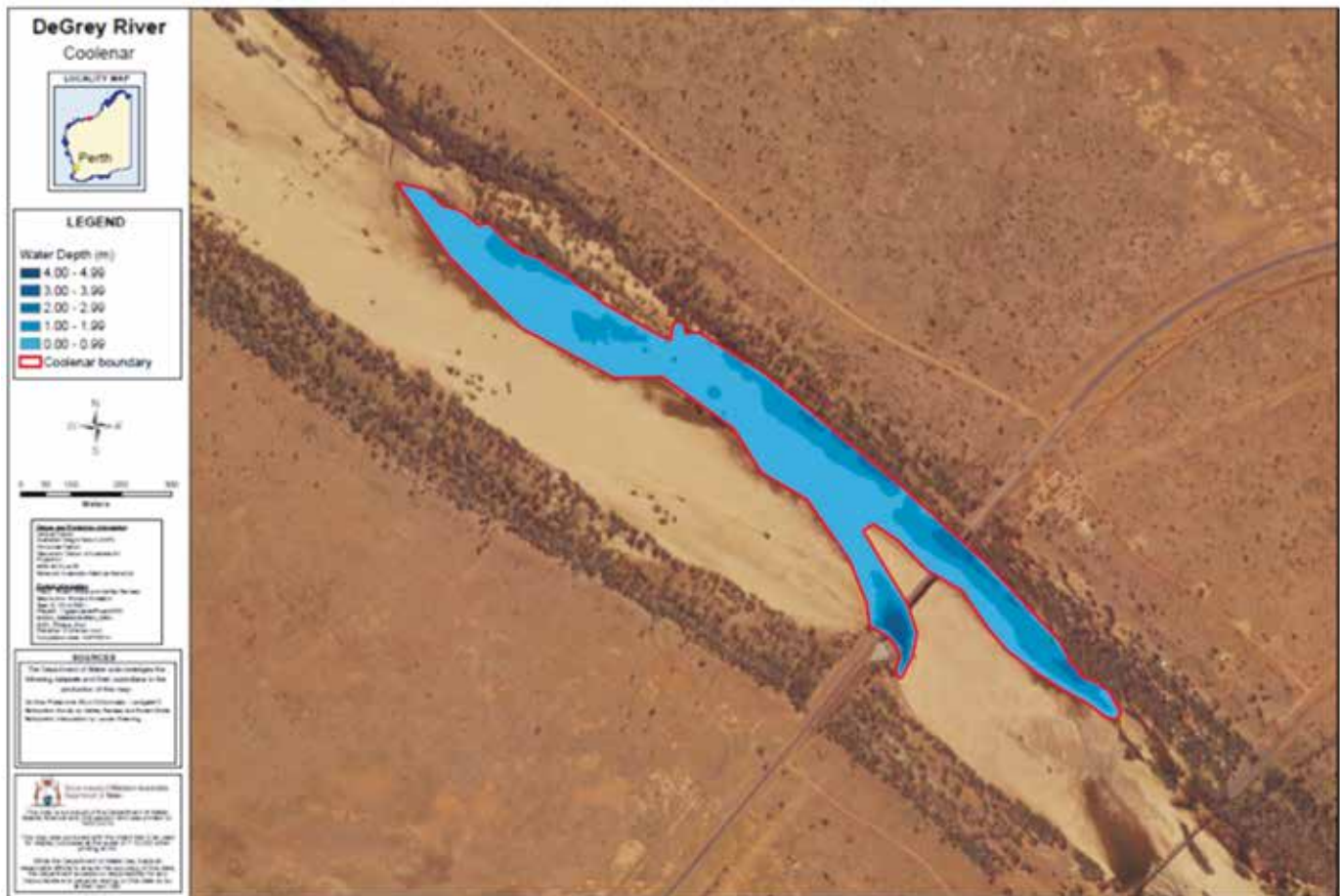
Following our GPS coordinates, we wandered down to a tiny pool on the De Grey. After a look around we realised it wasn't the right pool, but before we turned to walk the 300 m back to the car Ash spotted a GIANT barramundi. Not only was it not flighty, it proceeded to swim up to our feet and check out what we were up to. We looked at each other, 'Wow, you don't see that everyday'. Although the fishing rod was handy, we returned to the car and continued on our journey, the amazing fish appearance emphasising where our energy levels were at by this stage. The Barramundi was left to swim another day. Possibly the second bad decision we had made that day.

The next morning we were greeted with a glorious site; the pool we had come to survey! We'd camped right next to it. Now all we had to do was get our rig across the sand and rock, launch the tinny and we were away.



Effort required to get the job done.

By this point in time I'd started to wonder whether we'd underestimated the Pilbara. However, after a quick 5x5, a JHA, and a safety text to our supervisor, we skull dragged the boat to the edge of the pool then winched it back up when we were done. Another pool bathymetry in the bank and we were off to the very welcome sight of the Coolenar pool gauging station and camp site, with its grassy banks and relatively easy launching 'facilities'. We pulled into the camp site that night after a huge, but successful day. That evening was shared with a variety of colourful characters. We listened to their prospecting stories and watched as they compared gold nuggets, but for the last time, no, we did not see any crocodiles. We are collecting river pool bathymetry. It's kind of like using a glorified echo sounder to measure the depths of the pool. In fact, that's exactly what it is.



Processed bathymetric survey of the culturally significant Coolenar Pool on the De Grey.

Bed couldn't come soon enough..... Oh, for those involved in the safety call incident we have included a couple of photos below. As proof we were OK, and that we did indeed lose and later recover the phone in question, from beneath the wood decks of the tinny.



While the safety situation is far from funny, it was one of those occasions that given the effort we had put in up to this point in the trip Ash had promised that this night we would chill, actually have dinner and later call our wives. He kept his word and that phone call on a charging satellite phone proved to be the difference between an uncomfortable situation and a complete disaster.

## Fortescue

After another quick stop in Karratha to replace our trailer lights that WERE welded onto the trailer, we were off to the Fortescue River at Bilanoo gauging station. We had no issues here. Launching was simple and it was a fairly straight-forward bathymetry. I made the mistake of mentioning to Ash, 'I wonder what Mike was talking about when he mentioned the spikey bush?' Maybe these northerner's don't like getting prickles in their socks or something. We'll have to ask him when we get back.



Bilanoo gauging station pool.

The next day we were off to Mardi station to find the lower Fortescue sites. We were allowed to access the river through their property but we were not given permission to go fishing, although we hadn't actually asked for it! It was only a couple of hundred metres down the track when we found the 'prickles' Mike had warned us about. Ohhhhhhhhhh those spikey bushes!



We very slowly followed our GPS coordinates and finally found one of the two pools we had been looking for. We surveyed the pool and called an end to our Pilbara bathymetry work. After a quick high five, one after we finished the pool and another when we escaped the thorns, we camped for the night on the banks of the Fortescue, satisfied with what we had achieved and trying not to think about the two day drive home.

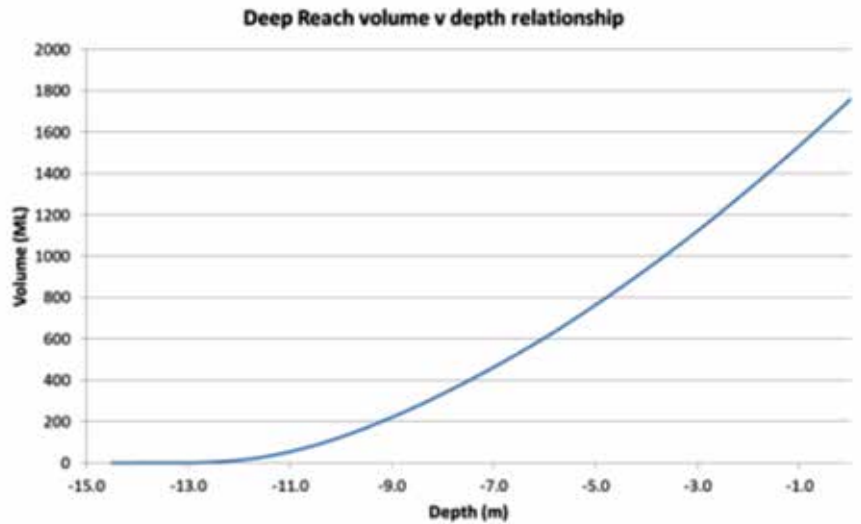


So in conclusion it was a very successful trip. Nine of the thirteen pools were surveyed with the final touches being added to our 50+ page report with all processed bathymetry maps, level vs volume relationships and methodologies.

On the banks of the lower Fortescue River.

The Deep Reach (Millstream) data set provides a good example of the kind of information we can gain from this work to support our understanding of the state's water resources and specifically the hydro-ecological components of both culturally and ecologically significant river pools.

With the steep banks of the Deep Reach Pool destabilised from cattle grazing there is potential for a bank collapse. A similar collapse of approximately three metres occurred at one of the other pools, Crossing Pool, leaving a lot of permanent root structure high and dry. This root structure is important for native fish habitat and refugia. If the same pool level decline was to occur at Deep Reach, it would lose approximately 800 ML of storage, reducing it from the current 1800 ML to just 1000 ML.



**Editor's note**

One of Ash Ramsay's other passions is as a budding film producer. He recently released a documentary on freshwater fishes of the Pilbara for Murdoch University. Some of the footage of this film was taken at the same pools Ash and Rob described above. Ash is happy for people to view his work [https://www.youtube.com/watch?v=d9v5DMzm\\_1o](https://www.youtube.com/watch?v=d9v5DMzm_1o)

# Cost Effective Ultrasonic Doppler Flow Measurement

## Unidata 6526 Ultrasonic Doppler Instrument

- Ultrasonic velocity measurement
- Depth measurement with barometric compensation
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- Computed flow measurement
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- SDI-12 interface
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# When is a measured difference an “error”?

**Glenn McDermott**  
Principal Consultant, Enviromon P/L

You guessed right. This is another measurement uncertainty article! The hydrographic industry is a measurement industry. So, it should ideally encompass measurement uncertainty as part of its business.

Recent work done for non-urban metering by the Australian National Measurement Institute has developed a practical “rule of thumb” for identifying if a difference between two measurements by two different measurement techniques can be called an error or not:

If the in situ check calibration measurement is at least three times as accurate as the station’s flow rate measurement, then the difference can be called an “error” in the station’s flow rate measurement.

An example from the irrigation flow measurement industry relates to their installed billing meters (i.e. flow measurement stations), all trusted to be achieving flow rate measurement uncertainties of  $\pm 5\%$  or better. This means that an in situ check calibration method needs to have a flow rate measurement uncertainty of less than  $\pm 1.67\%$  for the flow rate differences it detects to be called “errors”.

This is as described in ATS 4747.8: *for the in situ volumetric measurement to meet the requirements for in situ verification, the total uncertainty of the in situ measurement technique shall be less than 1.67%, which is one third of the total allowable error of meter installation.* (i.e.  $\pm 5\%$ )

If the in situ check method is NOT three times as accurate as the station’s flow measurement uncertainty, then differences are simply called differences, and not errors. In such situations the hydrographer will need to calculate the inherent allowable difference tolerance (ADT) before assessing the significance of an observed difference. The “ADT” is the combined uncertainty of the two measurement methods, and is calculated as:

$$ADT = \sqrt{U_{station}^2 + U_{in\ situ}^2}$$

**Where:**

- ADT is  $\pm\%$  allowable difference tolerance
- $U_{station}$  is the  $\pm\%$  flow rate measurement uncertainty of the station’s measurement equipment and method
- $U_{in\ situ}$  is the  $\pm\%$  flow rate measurement uncertainty of the in situ check calibration method and equipment

An example of using the ADT at, say a river flow measurement station with a level sensor and a rating curve, versus an in situ flow rate measurement check using an ADCP, will require the characteristic measurement uncertainties of both the rating curve and the ADCP to enable the ADT calculation. If the ADCP in situ measurement can be said to have a measurement uncertainty of  $\pm 5\%$ , and the station rating (at the level of flow at the time) also have a measurement uncertainty of  $\pm 5\%$ , then:

$$ADT = \sqrt{25 + 25} = \pm 7.1\%$$

In practice this means that any ADCP gauging with a deviation from the rating of less than  $\pm 7.1\%$  should be accepted as within the measurement uncertainty of the two methods (rating and ADCP), and no change to the rating would be necessary.

If an ADCP gauging's deviation from the rating exceeded  $\pm 7.1\%$ , then this is not necessarily of immediate concern (to change the rating). The reason for this is that all of these  $\pm\%$  uncertainty expressions are at the 95% percentile confidence level...so if the last 19 ADCP gauging deviations have all been less than  $\pm 7.1\%$  and only the present (20th) gauging exceeds that, this result still conforms with meeting the ADT with 95% percentile confidence. If, however, more than one gauging in the last 20 exhibits deviations above  $\pm 7.1\%$ , then there is cause for concern about the rating shifting (and/or ADCP calibration drift) which would need to be investigated.

So, to re-iterate, a gauging's deviation from a flow station's flow measurement (e.g. rating) can only be called an error (in the rating) if the gauging's measurement uncertainty is less than one third that of the flow station's flow rate (rating) uncertainty. Otherwise, the allowable difference tolerance (i.e. accounting for both methods measurement uncertainties) will need to be calculated before being able to assess the significance of observed deviations.

## Stanley Mort and His Pluviometer

**Ray Alford**  
Principal Officer, Hydrographic Support,  
Department of Natural Resources and Mines, QLD

*"I am of the opinion that I can design a reliable, serviceable, and accurate pluviometer, which can be manufactured in the Board's workshop at the cost of a few pounds."*

So wrote Stanley Fremantle Mort on the 30th November 1938. Stanley was a Senior Surveyor with the (Sydney) Water Board and saw the potential of automatic rainfall collection. There were already pluviographs on the market at the time, but they were expensive. A suitable model from Gibson Battle was 52 pounds and 10 shillings. An automatic instrument costing just a few pounds was an enticing proposal. The sum of 10 pounds was duly approved and allocated to Stanley to construct his prototype.

Stanley Fremantle Mort was born at Woollahra, Sydney on the 4th November 1889. His father was Henry Wallace Mort, the first rector of the Woollahra All Saints Church. He was the youngest child in the family, with two brothers, Harold and Selwyn and two sisters, Eirene and Eunace. The Mort family were well to do members of Sydney society, with the family wealth originating from the many enterprises started by Stanley's great uncle, Thomas Sutcliffe Mort. Among these were the export of refrigerated goods and the setting up of the wool market. There is a statue of Thomas Mort erected in Macquarie Place to honour these achievements.



Stanley, like his brothers, attended The King's School at Parramatta. He was an excellent scholar, winning form prizes and was dux of the year in form IV (19 year old Mort is pictured above). Stanley excelled at shooting, and was captain of the 1st team. He joined the Royal Engineers in WW1 and was awarded a Military Cross 1918, possibly at the second battle of the Sambre. After returning from war Stanley joined the Water Board, where he stayed for the rest of his working life.

Stanley married Boadicea (Dicie) Monk in 1916. Dicie had been a voluntary motor car driver, meeting the hospital ships returning from the front. Stanley & Boadicea had six children but unfortunately Stanley was left to raise them alone after his wife died following the birth of their youngest child. Stanley later remarried, but had no further children from the second marriage. Following Boadicea's untimely death, Stanley's mother in law, Margaret Monk, tried to gain custody of the children, but the matter was eventually dismissed after a court battle.

Stanley's two older brothers both became famous.

Selwyn Robert Mort gained fame for his endeavours in the mining industry. His photo is displayed in the Stockman's hall of fame in Longreach for his work establishing a smelting works at Concurry in 1906. He went on to become the Chairman of Directors of the Waroo Gold and Copper mine near Stanthorpe before abandoning the mining industry to work for the Water Conservation and Irrigation Commission at Leeton.

Stanley's other brother, Harold, became well known for a completely different reason. He had studied Engineering and gained employment as a surveyor with the NSW Rail and Tramway department. On December 22 1920, Harold was living with his wife, Dorothy and two young children at Lindfield in Sydney when Dorothy murdered her lover, the family doctor, by shooting him in the head. The victim, Claude Tozer, was a war hero and cricket star, and the murder and subsequent trial caused a sensation in Sydney at the time. Dorothy was eventually found to be insane and was detained at Long Bay Goal for eight years. During that period, Stanley Mort dutifully drove his brother to the prison for a monthly visit. A book about these events written by Suzanne Falkiner called "Mrs Mort's Madness" accurately recounts this piece of Mort history.

Stanley completed his prototype and installed it at his home in Hopetoun Avenue, Vaucluse on the 18th June 1939. It had cost 10 pounds, 15 shillings and 1 pence to construct. Here is how Stanley describes the operation of his pluviometer.

*"It consists of a catchment funnel 5" in diameter discharging into a copper tank 3½" in diameter in which a copper float is allowed to rise and fall with the water level. The tank is fitted with a syphon which empties it after two inches of rain has fallen, thus enabling an unlimited quantity of rain to be recorded without overflowing. The float, which is counterbalanced, is connected to a pen (or alternatively a pencil), which marks a chart on a 6" drum which is driven by an electric clock."*

After two months of testing, he was satisfied with its operation and submitted a proposal that a tender be let for the construction of ten instruments to his design with a recommendation that the mains powered clock be replaced with a battery powered one. The electric clock must have proved to be unreliable as the final production version ended up with a clockwork spring mechanism.

The advent of WW2 put the project on hold, but following the war, at least two pre-production models were produced. The design was taken up by Davies-Kent Pty Ltd in Mascot, who further refined the design and mass produced the instrument under the name "Mort Pluviometer" – see picture. It was widely used by government departments across Australia up until the seventies when the design was superseded by the tipping bucket style pluviographs.

Stanley Mort died on the 19th July 1976 at the age of 87 having lived long enough to see his pluviometer gain widespread acceptance.

I would like to thank Glen Murphy, Mike Lysaght and Tony Polchleb for additional information about the Mort pluviometer.

I would also like to acknowledge The King's School Archive Collection for the image of 19 year old Stanley. This was the only photo of Stanley that I was able to find.



# Remote High Flow Measurement

**Mark Randall**

**Senior Project Officer, Department of Natural Resources and Mines, QLD**

In 2010 the Queensland Department of Natural Resources and Mines (DNRM) purchased a number of Horizontal Acoustic Doppler Current Profilers (HADCP) in a bid to measure high flow flood events at gauging stations that are either too remote to access during the wet season or too dangerous to measure. With high expectations the HADCPs were installed at a set gauge height and left to run while waiting for an event to occur. While the HADCP functioned quite normally when installed below the water surface, they do not particularly enjoy being mounted out of the water. The large stage range between dry season base flows and wet season events means that the HADCP must be installed out of the water and mounted at a suitable elevation to measure the mean flows of a pre-decided event height. We found that nearly all installations failed for no apparent reason. The HADCP would simply stop logging after a random period and would usually miss the event they were installed to capture. I spent the following couple of years running a single installation on a permanent basis trying to eliminate contributing factors, but they were too random to decipher.

After sharing my predicament at the first ADCPs in Action conference on the Gold Coast in 2013, Josh Berry from UVS decided to assist me in my quest. In December last year we installed the first DL25 logger in the field at a new gauging station site called Rankin Ck, located in the Wet Tropics near Innisfail. This site can experience a rate of rise of 8 m per hour which usually occurs at night and therefore would be impossibly dangerous to measure manually. In the sweltering humidity of the tropics and with the help of South Johnston hydrographers Juan Bouttell and Daryl Harper, we installed a 600 kHz Channel master at 2.1 m gauge height, which is approximately 1.3 m above the end of dry base flow. The DL25 is an in line logger within the HADCP cabling and at this installation it is located inside the gauging station hut. However, for sites that have a longer gauge line the DL25 is submersible to a depth of 50 m so it can be installed in a pit mid-gauge line, thus eliminating the restrictions associated with RS232 data communications.



Juan Bouttell and Daryl Harper helping with the installation of the HADCP.



HADCP setup on gauge line.



Josh Berry from UVS setting up the DL25.



DL25 logger set up in gauging station hut.

The DL25 stores as well as broadcasts the data to the web. I can now go online and check the status of the HADCP, a terminal page allows me to directly control the HADCP so that I can send new commands, I can start and stop it logging, and basically anything that I had to previously do on the side of the river bank I can now do from my laptop or smartphone. I can download data files for processing as well as allowing the DL25 to undertake on-board processing for an instant graphical view of stage and velocity changes.

System Info		File Logging Status	
System Time	14:58:13	Logging	Logging
Time Since Reset	12:02:42:51 (d:h:m:s)	Free Space	0.0% used
Battery	13.3 V	Current Log File	112006BFeb15.PD0
Temperature	46.7 °C	Memory Card	No Error
System Current	175.1 mA (2322.8 mW)	High Speed Mode	Disabled
ADCP Current	14.3 mA (189.1 mW)		
Location			
Ping Time	100 ms		
Time to sleep	10:00 <input type="button" value="Postpone"/>	Error count	0 error log entries

Home page for the DL25.

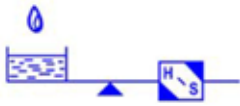
A second issue that the DL25 has solved for me is memory. The HADCP only had a 4 MB internal memory which would fill very quickly depending on the amount of data to be collected. This meant that for a remote installation over the wet season, where a large event can occur anytime between December and May, the amount of sampling had to be spread out over that period so as not to run out of memory. The DL25 has 32 GB of memory so I can sample as often as I wish with more bins of data per ensemble eliminating the danger of not being able to fully measure the entire hydrograph. In streams with very fast rise and falls such as Rankin Ck this was previously not possible without regular site visits to retrieve the data before it would be overwritten by the loop memory.

Just as the installation of effective communications has been of huge benefit for the monitoring of our gauging stations, this new logger for the HADCP is going to be a great step forward in helping me to capture this elusive high flow data. I am no longer operating blind and have already managed to correct a couple of malfunctions with the HADCP using the DL25. I believe these same issues may also have been the reason for previous onsite failures. Now I am able to solve the issue remotely without missing out on the opportunity to collect data, instead of finding out months later after the wet season has finished that the HADCP had malfunctioned.

I am currently installing a second DL25 and 300 kHz Channel master on the Herbert River, a high priority site that is inaccessible during the wet season. Previous installations here have been mostly unsuccessful due to unknown HADCP shutdowns. Last year I recorded a 4.5 m event, managed to visit the site to save the data, the HADCP was started logging again and an 8.1 m event occurred from Cyclone Ita. Despite the entire setup process and configuration being exactly the same, the HADCP went into shutdown just a couple of weeks later and the event was missed. I can assure you a few hydrographic expletives were hurled into the river when I excitedly got back on site to collect my highly anticipated and non-existent data!

While the wet season has yet to really start here in far north Queensland, it is certainly on its way and I'm looking forward to the opportunity of finally capturing this previously elusive data. Following the wet season I plan to use this technology to undertake recession gaugings remotely using the DL25 and compare the rating derived from the HADCP with that of the traditional current meter measurements from our routine site visits. If successful, I should be able to undertake a gauging and check the gauging station all from the comfort of my desk.

I hope to present a full roundup of these DL25 trials as well as introducing a new methodology for processing HADCP data at the upcoming ADCPs in Action Conference in May.



Established 1968



Hydrological Services Pty Ltd

February, 2015

## Latest Products

### Cable Fox

(Portable Cable Mounted ADCP Positioning System)

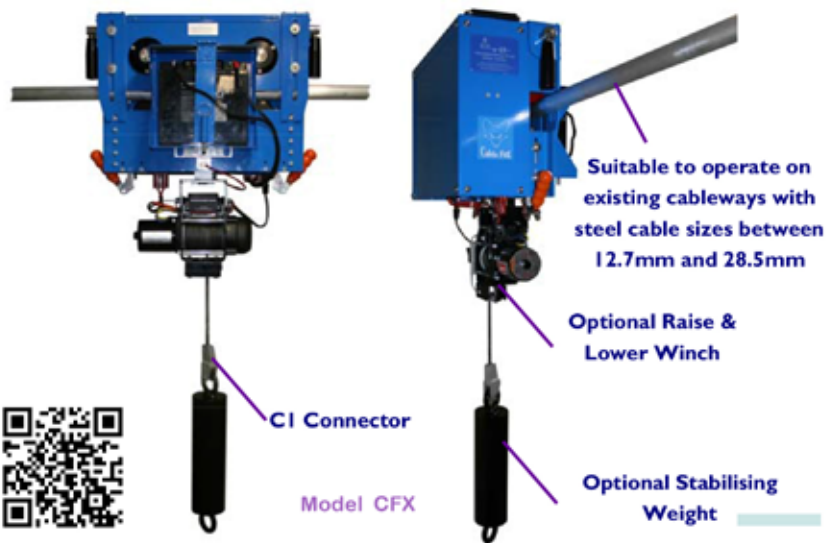
- Ability to operate on steel cables from 12.7mm to 28.5mm
- Secure onto cable to prevent accidental detachment.
- Traversing speed adjustable from 0.01m/s to 0.60m/s
- Traversing distance measured, with waters edge zeroing.
- Ability to raise and lower the ADCP from the water. (Optional)
- Automatically stops when CI connector comes into contact with winch when raising.
- Cable Fox traversing brakes activated when stationary.
- Brake is released when Remote Control is switched off – for manual retrieval.
- Automatically returns to the home position if comms is lost for 2 minutes.
- (Home position is defined as the position where the Cable Fox is turned on)
- Measures Cable Fox BattV + Current, Remote Control BattV and signal strength.
- All fuses are automatically resettable.
- Remote Control alarm beeps when Cable Fox battery is less than 10.8V
- Cable Fox can ONLY be moved toward home position when battery is less than 10.5V
- 400m communication range.
- Operates on a single 12V 18Ah battery



Wireless Operation

What differs the CFX from other cableway systems is its ability to operate on any existing cableway system with a main cable installed and without the need for any additional accessories.

The CFX is operated wirelessly up to 400 metres (1312 feet) without the need to be near the river bed in a dangerous flood situation. Hence, the operator can manoeuvre the unit remotely feeling safe and having the ability to collect his measurement more accurately. <http://www.hydroserv.com.au/products/cfx.asp>



### Hartbeat

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<http://www.hydroserv.com.au/products/hbtl.asp>

- Power +9.6V to +30V DC, over voltage protected with resettable polyfuse, reverse polarity protection and powers down Hart interface to conserve power.
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- Interface #1 SDI-12 Available on all units (Conforms to SDI-12 V1.3)
- Interface #2 Select via DIP switch 1-1, either :
  1. SDI-12 V1.3 OR
  2. RS485 (2 wire) Modbus interface
- User Selectable Options Internal DIP Switches
- Operating Temperature -40C to +70C
- Environmental IP65
- Dimensions 120mm x 90mm x 55mm (L x W x D)

Model HBT1

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# In Memoriam

The hydrographic community of Australia lost three of its colleagues last year. Unfortunately this issue of the Journal is published well after their passing. I therefore apologise for these late notices but believe it is still appropriate to honour their lives.

## Mik Sievers

*Via Paul Martin*

**Manager Water Services, Department of Natural Resources and Mines, QLD**

Mik Sievers passed away on Thursday the 23rd October 2014 after suffering a heart attack. Mik was as large as life and spent time at the Rocklea Hydrographic Support facility with Ray Alford as an instrument man, Brisbane office as an hydrographer, with Seqwater as a WQ officer and hydrographer, and worked at Sontek/YSI (with Arran Corbett), before returning to Seqwater for a short stint. He resigned from Seqwater to pursue further water business interests about a month before his passing. He is survived by his wife Kate and twins Andrew and Violet and will be missed by all that knew him.

## Doug Thatcher

*Via Krystal Hoult*

**Hydrometric Officer, Department of Primary Industries | NSW Office of Water**

I wish to notify those that knew Doug Thatcher or his family that he passed away on Thursday 4th September, 2014 at the age of 86.

Doug was a retired hydrographer who previously worked out of the Tumut Office.

## Wayne Davies

*Via Josh Rosair*

**Natural Resource Management Officer (Hydrography) Department of Water, WA**

Wayne Davies started in 2003 in the Water and Rivers Commission of the WA Government, employed as a Natural Resource Management Officer in the Bunbury office of the South West Region. After a short period in Licensing and Water quality, along with a name change to the Department of Environment, he began working in the Measurement section as a hydrographer. In 2005, he started a Hydrographic traineeship and not long after he finished in 2007, the Department of Water was created.

Wayne was a modest man and a hard worker who was very committed to water resource management. He had a real passion for his job and this was reflected in his work. Although a firm believer in traditional hydrography, he embraced and showed a real interest in ADCP technology and the part it plays in the precise provision of hydrographic flow data. So much so that he became the department's sole representative on the Acoustic Doppler Technical Reference Group. He was well respected and liked throughout the department, and he was a very meticulous and loyal member of our hydrographic team.

An avid lover of the outdoors and anything water, whether it be surfing, fishing or landscape photography, he was a talented waterman and was able to capture these moments with his aptitude in photography. He would regularly be on his board of a weekend or in his tinny fishing, always with camera in hand.

Wayne passed away, following a tragic surfing accident, in early August 2014 and it is with great sadness that we have lost such a great man. He is deeply missed by his workmates and friends, and he, along with his achievements and contributions to the industry, will not be forgotten. Our sincere condolences extend to his immediate and extended family.



## Position available

Agency/Company: Australian Hydrographers Association

Position title: AHA Journal Editor

Location: Wherever you are

- Are you a good organiser?
- Do you have a degree of flair with writing and editing skills?
- Like to know what's happening in Australian hydrography before others do?
- Do you want to widen your personal networks?

Applications are required as soon as possible. You don't have to be a grammatical expert, a graphic artist, or a publishing guru. Others will help you.

(The position is voluntary, and although you will not have voting rights at committee meetings, you will not be required to attend any meetings!)

**If the skills required attract you, please contact:**

**Frank Davies**  
journal [at] aha.net.au

or

**Grant Robinson**  
publicity [at] aha.net.au

