Australasian Hydrographer

December 2012

The 2012 AHA Conference
(Photographs provided by Peter Heweston, Kisters)

AUSTRALIAN HYDROGRAPHERS ASSOCIATION

AHA

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FRANK DAVIES

Editor's Introduction

Well, I hope you have some time to sit down and read this journal. And once you have, I would be surprised if it does not also encourage you to think about your career in hydrography and ways in which you can contribute to it on a broader scale rather than just watching your pay go into the bank each fortnight.

Without wanting to pre-empt the journal content, it has certainly been a very busy past six months for the AHA Committee. As a volunteer for the committee I receive all its emails. In both number and complexity, these have been a clear indicator that a lot is going on in hydrography in Australia. Much of this activity is reflected in the journal content. If there are aspects which you read and are unclear about, then do not hesitate to contact the person concerned. I can guarantee they will be grateful that you have shown interest in what they are attempting to achieve and would welcome your questions or offers for assistance.

This journal was intended to include proceedings of the August AHA AGM held on the first day of the conference. Due to the amount of content in this journal, it was decided to independently communicate this information to members.

NSW's Anthony Belcher provides a good overview of the Q-Boat. These were also demonstrated during the conference field trip. Being able to undertake water measurements without requiring the operators to endanger themselves is a significant bonus. Are the Q-boats the answer to this problem?
Does anyone else have any thoughts?

Thanks again to the WA Department of Water and the authors concerned for permitting the use of two more articles from their Hydrographic Newsletter.

A point of clarification on email addresses in the journal. Due to a spamming episode some time ago, the journal avoids explicit email addresses. Where an email address is included it is encrypted, meaning that you will have to reformat it manually prior to contacting the person concerned.
e.g. fred.blogs[at] world.net.au reformat to fred.blogs@world.net.au

An anomaly rectified

I recall over the years that there have been many questions raised as to the correct grammatical title of the AHA; should "Hydrographers" have an apostrophe and if so should it be before or after the "s"? This has finally been settled as part of a motion proposed by Grant Robinson and accepted at the August AGM.
The formal title is now:

Australian Hydrographers Association

This usage will be applied consistently to the AHA website, in the journal, in any letter head templates and any other documents.

BILL STEEN

Chairman's Address

I know I've quoted Bob Dylan before but I have to start with the old favourite "The times they are a-changin' ". 2012 definitely witnessed some massive changing in the Australian hydrographic industry.

To start with 2012 saw the 16th biennial AHA conference held at Moonee Valley Racing Club in August. It was a novel location and turned out to be an excellent choice. I must admit that I had my reservations holding such an important AHA event outside of the CBD, let alone at a race course. My fears quickly evaporated on seeing what the facility had to offer.

For starters the trade area was one large room where basically every booth faced the centre of the room and no one booth got preferential treatment. This was verified by the feedback from the vendors. As per any good conference all meals and breaks were held in the trade area giving maximum exposure to the vendors. Again this was very much appreciated by the trade booths.

Numbers were a little lower than the previous conference in 2010. The key contributor to this was the current financial climate. Water authorities and private industry found it financially tough to send multiple people. And I must add that I take my hat off to several participants who self-funded themselves to attend. I think that is a statement in itself that these people were dedicated and saw the direct benefit from attending.

In saying the numbers were lower than 2010 does not reflect that the 2012 conference by far generated a larger financial return back to the AHA. This was achieved primarily from the selection of the Moonee Valley Racing Club as the venue.

The conference was structured differently to previous conferences as well with set topics and sessions followed by discussion which was led by a panel of experts. From the feedback received this concept was very successful and a format the Association may follow in the future.

The AGM was also held during the conference and I'm happy to say that those up for election were re-elected. I congratulate those who were happy to stand again and continue the ongoing work on behalf of the members of the AHA.

Overall I think the conference was a huge success and the Association would like to thank the convenors, John Cameron, Paul Sheahan, Todd Lovell, Peter Zimmermann and Krystal Hoult.

KRYSTAL HOULT

AHA Membership Update

All corporate membership and many of the individual renewals have now been distributed. As a courtesy due to the delay in renewal forms being sent out, all members who were financial in 2011/12 have maintained their AHA financial status. However, if you have not renewed your membership by 31 January 2013 you will then become non-financial.

Invoices for membership payments received to date for the 2012/13 financial year have been sent out. If you feel that you have made payment for the current financial year and have not received an invoice then please get in touch.

A new email address has been set up for all things membership related. If you are emailing in your membership form, have any queries or questions in regards to payments or invoices, or would like to check and/or update your details in the membership database, then please email membership[at] aha.net.au.

There was an error with the pricing in many of the initial renewal forms sent out; I would like to confirm that current AHA membership prices are as follows:

- Individual $110
- Student/Cadet/Retired $38.50
- Corporate
    - Bronze $605; 1 member
    - Silver $1,210; 6 members
    - Gold $1,815; 12 members
    - Platinum $2,420; 20 members
    - Platinum Plus >20 members (price on application)

It is exceedingly likely that we will be switching to an online member management system for the 2013/14 financial year. Details about how this will work for you and your organisation will be made available closer to the time.

AHA Conference Wrap-Up

Krystal Hoult
AHA Secretary

Overall, 199 individuals attended the various facets of the 16th Biennial Australian Hydrographers Association Conference held at Moonee Valley Racing Club in Melbourne from 21-24 August 2012.

Congratulations to Natalie Noakes from Sydney Water whose presentation "A Hydrographic Journey along the Hawkesbury Nepean System" took out the Alex Miller Award for best conference presentation, as voted by the floor and presented by Mike Lysaght of Hydrological Services. Commendation also goes to Paul Hannah from Otago Regional Council whose presentation "Heli Gauging and ADCP Platform Design" received a significant number of nominations for the award.

Conference DVDs have been distributed to all those that attended. If you have not received your copy please email secretary[at] aha.net.au - there some spare copies available.

Much appreciation, thanks and indebtedness goes to the following people for making the conference possible.

- The team at National Promotions; John Teres, Katy, Bronny and Christa.
- Jess Patrick and the staff at Moonee Valley Racing Club.
- The 2012 Convening Committee, specifically:
  - John Cameron for assisting with the welcome desk during the conference and taking on the organisation and running of the interesting and informative field trip day.
  - Bill Steen for "volunteering" as MC and keeping us entertained and well-balanced at all times (during conference and in the organisation lead-up).
  - Paul Sheahan for his efforts as time keeper, ensuring that the conference ran to time as per the running sheet (no mean feat when you consider the running sheet was broken down to four minute intervals at times).
  - Todd Lovell in his role as speaker liaison, ensuring that all 30 presenters and discussion panel participants were where they were meant to be when they were meant to be there.
  - Peter Zimmermann for taking discussion forum notes on behalf of the chairs.
- Michael Whiting and Mic Clayton for being so forthcoming in sharing their experiences in all things AHA Conference related, meaning that there was at least some method to the madness.
- Max Hayes for his tireless efforts throughout the conference, including collating the majority of the welcome packs; you are a true superstar Max.
- Ray Boyton, Peter Heweston and Bill Steen for chairing their relevant discussion panels and for their insightful efforts in the write up of the subsequent outputs which will give the AHA invaluable direction moving forward over the next two years.
- Frank Davies for his efforts in editing the conference program.
- Alan Baker for his involvement in videoing each of the discussion forums.
- Sean Fagan and Liam Curtis from the Department of Sustainability, Environment, Water, Population and Communities who did the honours with the roaming microphones during the discussion forums.
- All of the sponsors and exhibitors.
- The keynote, lead address and paper presentation speakers for putting in the time and energy that it took to produce relevant and streamlined presentations.
- Those who took the time to create a poster paper for display.
- The companies, organisations, and managers who supported the attendance of their staff.
- All of the delegates who took the time out to attend, especially those who travelled from overseas and interstate.

We look forward to seeing you all again in 2014!

AHA Conference Session Summaries

Data

Peter Heweston (Chair)

The session on data covered a variety of topics relating to the long term value and use of hydrometric data.

Speakers and panel members:

Dr Robert Argent	Water Information, a National Treasure
Dr Sabine Schreiber	Why Data Matters - Surface Water Data as Assets
Janice Green	When the Data Hits the Road
David McPhee	Future Delivery of Hydrographic Services
Eric Hatfield	Automatic Data Checking for Stream Data
Royd Cumming	Measurement Uncertainty and the Development of Data Quality Codes

Rob Argent from the Bureau of Meteorology (BoM) discussed some of the data-related products that BoM are now producing that could never have been envisaged by the people who started collecting climate data 100 years ago, before climate change, before real-time flood warning, before seasonal rainfall outlooks, even before water accounting, but possibly not before interstate rivalries over water usage!

Sabine Schreiber from DSE in Victoria spoke passionately about the value of water data long after its original uses have been forgotten, as well as discussing the complex shared administrative arrangements that surround water data collection in Victoria.

Janice Green discussed BoM's need for long-term high quality records and highlighted some of the potential data problems that need to be detected and screened out in order to produce a high quality database for long-term rainfall intensity studies.

Data Discussion Summary

Data Standards – There was a strong underlying theme that industry standards need to be set to assist data collectors in their role collecting and managing data so that data users can better understand if the data set is fit for purpose. At present the way in which data is coded is out-dated and more emphasis needs to be placed on associated metadata to ensure current and future proofing of the data sets. This entails educating end users in how they can interpret data quality as every end user has a different data requirement and can interpret quality in a different manner.

A major focus was on the importance, storage and reporting on metadata such as measurement of uncertainty, technology used to collect the data, and therefore the quality could be described as a matrix.

Role of the AHA - BoM is already facilitating the Water Information Standards Business Forum and the AHA is well represented in this forum. The AHA has been actively involved in publishing the draft standards and calling for feedback through it members via the AHA website and social media such as "LinkedIn Connections".

The AHA still has a role to continually assist in the development of future standards, and to facilitate the understanding of data users and their requirements, industry capability and the burden associated by the data collectors and data managers plus the adoption of standards to improve the data quality.

Hydroacoustics

The Panel:

Ray Boyton (Chair)	Paul Hannah
Kevin Oberg	David Spiers
Mark Randall	Garry Leslie & Wayne Ross
Rohan Oliver	John Hayes

Aside from the chair, each of the panel members presented to the AHA Conference. This summary is the work of the chair without input from the panel members.

Generally, most Australasian hydrographic groups continue to deploy and utilise acoustic doppler (AD) technology more often. Some hydrographic groups are undertaking more than 80 per cent of stream flow measurements using ADCP devices. The installation of ADVM has progressed, however it seems to be limited by available budgets.

The main themes emerging from the hydroacoustics papers, presentations and discussion can be grouped in the following:

- Deployment Technologies.
- Standards and Procedures.
- Training.
- Data Management and Software.

Deployment Technologies

A number of the presentations and discussions revolved around how best to utilise and install AD technology to achieve more accurate results and provide a safer working environment. This included:

- Undertaking ADCP gaugings from helicopters.
- Improved traversing apparatus.
- Better designs for ADCP ‘boats’.
- Improved infrastructure for protecting in-situ ADVMs.
- Better understanding of site conditions on the location of ADVMs.

Take Home Message

While the ADCP and ADVM technology is relatively stable, new and better “peripheral equipment” will continue to be developed by both the market suppliers and hydrometric groups both privately and publically operated. The AHA should facilitate the transfer of knowledge between hydrographers but allow the marketplace to determine the success or otherwise of such inventions.

Standards and Procedures

The work of the Unites States Geological Survey (USGS) was presented by keynote speaker Kevin Oberg. The area of standards and procedures continues to evolve with minor changes being suggested including “moving boat with bottom tracking” and “moving bed with GPS”.

The USGS are undertaking a number of checks to reassure themselves of the reliability of the AD equipment. This is being integrated into their suite of standards and procedures.

The conference was advised of the work of the Australian Acoustic Doppler Working group (funded by BoM) the development of national guidelines and operating protocols. These have been adopted by a number of hydrometric groups while others have taken different approaches.

Take Home Message

The area of ADCP and ADVM will continue to develop relatively quickly over the next two-five years. Without a national focus (or state) individual agencies are likely to further develop their procedures in isolation.

While BoM have shown significant support to AD standards they have the whole range of national water standards within their charter. The AHA may see this as a key activity at this point but does not have the resources to fund or coordinate the continuation of a national approach to doppler technology. It will need to rely on AHA members to work collaboratively under the banner of the AHA.

Training

The need for specific training in AD was highlighted by USGS speaker Oberg. All USGS ADCP users are required to undertake a minimum of one weeks training prior to operating an ADCP. Follow up training is also part of the requirements. The USGS model is not to use product supplier training but provide a broader training package within the organisation.

Take Home Message

Unlike the USGS, Australia will not have the resources to have a dedicated team working on AD support and R&D. In the short term at least, individual hydrographers will take on roles within organisations. The AHA should facilitate information and training opportunities with key USGS staff on-line and in Australia, with the goal of developing a core of highly skilled trainers to further up-skill our hydrographers. Efficiencies also exist with our New Zealand counterparts being aligned with these activities. Over time, AD will be fully integrated into formal learning packages. This is an area outside the scope of this panel.

Data Management and Software

As with most new technology, data management and software applications lag behind the deployment of new equipment. This is the case with AD. Most agencies that have undertaken a significant number of AD purchases and deployments have realised that the current information archives and supporting systems do not fully cater for AD data.

With standardisation of AD data storage regular reviews can be conducted with agencies able to compare results.

Take Home Message

The AHA should encourage:

- Manufacturers to make more of the AD source data available.
- Hydrometric groups to standardise on metadata for AD.
- Water software providers to provide database tools to explore and present AD in their standard suite of products.
- Hydrometric agencies to pool staff and financial resources to achieve data management and software enhancements.

Conclusion

This document contains a number of recommendations for consideration by the AHA committee. This does not represent all the areas that the AHA may be concerned about in the area of hydroacoustics.

Additionally it is recognised that other aspects of hydrography from the other discussion panels will need to be evaluated and prioritised based on the limited resources available to the AHA.

Education

The Panel:

Bill Steen – Chair	Scott Walker – ALS/OTEN
Paul Langshaw – AHA Training Coordinator	Grant Leslie – WSAA
Simon Cruickshank – Northern Territory Government	Warren Jack – Australian Institute of Training

Speakers

Paul Langshaw – Where to from here?
This paper discussed the status of the training undertaken by the AHA including the new diploma course plus the ongoing battle to get the hydrographic certification register up and running.

Simon Cruickshank – Competency based training in the Northern Territory.
This paper discussed the experience shown in the NT that it takes at least four years to train a suitable and motivated employee into a fully capable hydrographer.

Grant Leslie – The role of Water Services Association of Australia in the Urban Water Workforce Development project
The project consists of five stages including developing a water industry occupational and competency framework.

Education Discussion Summary

Certification:

The discussions centred on the certification process with invaluable input by Grant Leslie from Water Services Association of Australia (WSAA). Grant was able to provide direction on how to promote certification and hydrography as a career. The promotion of the certification process needs to be undertaken at all levels, such as:

- State and Commonwealth agencies providing incentives through salary structures to encourage hydrographers to complete appropriate qualifications or if qualified to register with the AHA.
- Hydrographers should support the certification process.

Hydrography as a career:

There was discussion on how to promote hydrography as a career. Again, Grant Leslie was able to shed some light on how the water industry was promoting careers including discussion from the conference participants.
The outcomes included:

- WSAA is looking at a water industry apprenticeship scheme.
- Agencies and hydrographers should get involved with school career nights in their local regions to promote hydrography.
- A certificate 2 or 3 could be developed, if there is a need and money, to develop units to appeal to those outside of the industry as an entry level.

Role of the AHA

- The AHA to work closely with WSAA to promote hydrography as a career through http://www.h2oz.org.au/
- The AHA to work together with other water associations to come together as one to promote a career in the water industry.
- The AHA to lobby State and Commonwealth agencies for the recognition of hydrographers as a professional group of people.
- The AHA to lobby associated industries who employ hydrographers, such as mining, to insist on contracting certified hydrographers.
- The AHA to provide employers an outline of the diploma course and associated training requirements from entry level to a certified hydrographer.

AHA Conference Field Trip

John Cameron
Department of Sustainability and Environment, Victoria

Approximately 45 people attended a bitterly cold and blustery field trip following the 2012 AHA Conference. Although the weather conspired against us, it seems all enjoyed the opportunity to have a brief look at what is happening in Victoria.

The field trip visited several sites selected for their challenge to conventional thinking about hydrographic practises and processes and where some innovative solutions to long-term issues were provided. The aim was to also showcase some of the picturesque areas of Victoria.

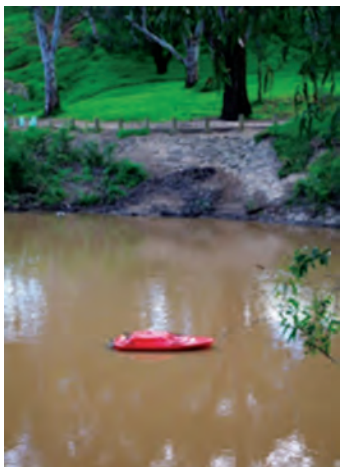
There was some discussion about bushfires, their impacts on local communities and hydrographic systems and the ways that hydrographers support recovery from such fires. In addition, the trip aimed to broaden the understanding about bushfire impact on natural environments.

The three sites visited included an instrumentation and infrastructure test site operated by Thiess, a long term yield study site, and an urban acoustic doppler installation.

Maribyrnong River @ Keilor

(Editor: See Tom Candy's detailed description of this site below)

Thiess have a test site operating here to investigate and compare instrumentation from multiple manufacturers. The site is in its infancy but items such as fuel cells and wireless transmissions were displayed. ALS also provided a moving boat gauging presentation utilising the remote controlled Q-Boat.



Badger Ck @ Coranderrk

This project was established in the 1960s to determine the variance in water yield between mature and immature forests. Three sub-catchments are monitored. One was clear felled, one partly cleared, and the other retained in pristine condition. As the project was part of an AHA field trip in the 1980s this caught the interest of those hydrographers who attended the first trip. The site visit contrasted the variances in yield from catchment to catchment, the impact of fire on adjoining catchments, and the threat that fires have posed on the pristine catchment.

There was a short walk to a well-established monitoring site. Here a strip chart recorder had been temporarily installed for the education of those hydrographers who only know loggers and for the nostalgia of the older drogies.

Merri Ck @ St Georges Road

This site is located in an outer Melbourne metropolitan landscape complete with all the related challenges. Discussions centred round the challenges and innovations required to harmonise with local infrastructure and the human animal. An auto-sampler and acoustic side-looker located here created much interest and discussion.

A number of organisations worked interactively to provide as much background and site information as was possible within the short timeframe available.

The conference convenors would like to acknowledge and thank the staff from Melbourne Water, the Department of Sustainability and Environment, Thiess Environmental and ALS services who assisted with making the day such a success.

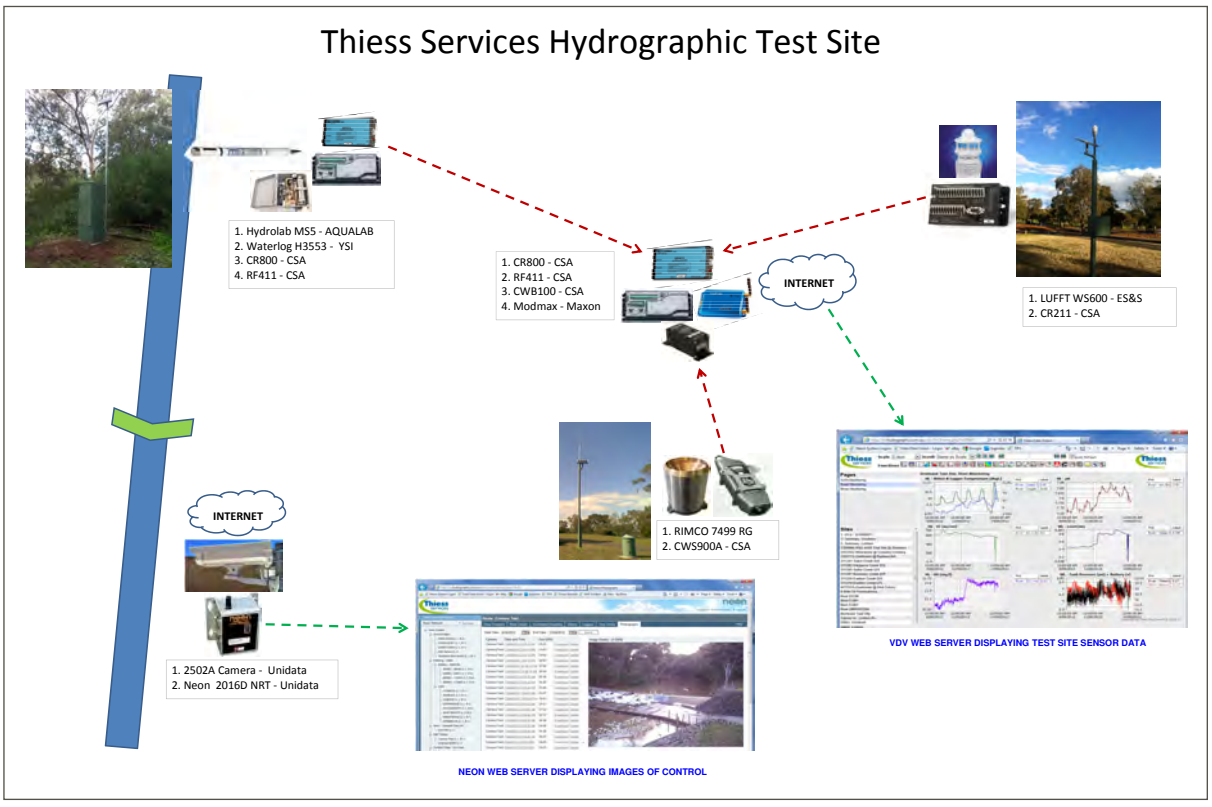
Maribyrnong River @ Keilor Trial Site

Tom Candy
Thiess Services, Gisborne, Victoria

The Maribyrnong River @ Keilor (Brimbank Park) site first had staff gauges installed in 1908 and has been monitoring continuous water level since 1966. Over the course of the last year Thiess Services have been developing a trial site in tandem with the existing monitoring equipment at the site. The aim of the trial site is to test hydrographic instrumentation and infrastructure in 'real world' conditions.

As part of the AHA conference field trip, attendees were given a brief overview and then invited to tour around the different parts of the site where Thiess Services staff and representatives from instrumentation manufacturers were on hand to field questions.

Attendee welcome by Thiess Services Research and Innovation Manager Michael Wheaton.



Schematic of the site showing the instrumentation in use and how data is communicated between the various components.



This sequence of three images was taken over a 24 hour period. A Unidata camera and Neon telemetry system installed at the site takes hourly still images of the control and transmits them to a website so they can be viewed in near real time.

Hydrogen supply for the prototype ES&S Fuel Cell which was on display at the site.

Lufft weather station which is being trialled at the site. It monitors wind speed and direction, temperature, relative humidity and rainfall. Rather than a tipping bucket, rainfall is measured by a sensor pad which allows the design to be very compact. Readings are radioed back to the central data logger at 15 minute intervals and then displayed on a website.

A Kiwi's AHA Conference Perspective

Paul Hannah
Otago Regional Council, New Zealand

I was fortunate enough to be able to attend the 2012 Australian Hydrographers Association conference held in Melbourne. The AHA conference is held every two years. My being able to attend was largely due to the generous contribution of $1150 towards travel costs from the New Zealand Hydrological Society and ENVCO. I also received complimentary registration and field trip costs covered by the AHA valued at over $800. This generous prize (worth a total value close to two thousand dollars) was awarded at the 2012 NZ Hydrological Society workshop held in Nelson on May 11 for a presentation I gave on trialling flood gauging from a helicopter using an ADCP.

Some holiday time was planned either side of the conference to make the most of traveling over the ditch. On arrival in Melbourne, my wife Amber and I were picked up by a friend and his son and drove north west for four hours to a cabin at Mount Zero situated on the edge of the Grampians National Park. The following couple of days were spent rock climbing on some incredible granite faces, hiking and coming across some crazy wildlife.

Conference registration kicked off on Tuesday evening with the fellowship session (cheers SonTek). The next morning at 08.30 everybody turned up to the Mooney Valley Racing Club for a quick catch up with colleagues and suppliers before the conference officially started at 9 am. It is a credit to the conveners William (Bill) Steen, Krystal Hoult and co., how many interesting presentations and discussion topics were compressed into the two days of the conference; it was run with military precision. ADCPs were the hot topic on day one with seven of the ten presentations shown relating to ADCP use and deployment.

One of the interesting discussions relating to ADCP use was the difference Australian hydrographers are seeing between ADCP and current meter gauging results at some sites. This reflects similar gauging results for some NZ sites, where gaugings completed with ADCPs consistently show less flow than a current meter. Generally, this difference is noticeable at high stage events. A comment was made that it is imperative to quantify why there is a difference within the next five years, before the current meter flood gauging skill base is watered down and lost. Interestingly, the US Geological Society (USGS) may not be in the same boat (according to Kevin Oberg), where USGS gauging results have not shown a significant low bias (>8%) when comparing ADCPs to current meters. This needs to be investigated further.

We were privileged to have Kevin Oberg give a talk on successes and challenges with hydroacoustics. Kevin is the national coordinator for hydroacoustics in the USGS. Kevin provided plenty of insight as to how the USGS deals with the rapidly advancing field of hydroacoustics. One resource of note that Kevin mentioned is USGS memorandums which help to document current best practice for ADCPs, which can be found at http://hydroacoustics.usgs.gov/memos/index.shtml.

Mark Randall highlighted one of the advantages of gauging with ADCPs in the Cape York Region that I had never considered (but found funny) was that you are less likely to get eaten by crocs. I also didn't realize a rifle was standard gauging kit for some field teams! Mark also manages an ADCP training program which incorporates a week long training program for staff. This formalized training session is similar to USGS training, which staff are required to complete prior to using ADCP equipment.

Other day one talks included Water Management Challenges in the Murray-Darling Basin, which highlighted problems due to a lack of water, the Victorian government's Strategic Directions in Water Resource Information Management, and NZ's Phil Downes, who provided insight into the challenges of running a hydrometric network during, and after, a major natural disaster.

Eleven speakers gave presentations on day two. The speakers provided talks on varied topics such as data

quality control, quality coding, and dissemination of data, automatic quality checking, staff training, and hydrographic qualifications. Australia appears to be in a similar boat when it comes to a hydrology technician qualification framework; the cogs are moving towards this goal but a few more hurdles need to be cleared before the full qualification framework is in place.

In summary, the sheer number and quality of presentations, as well as networking with equipment suppliers on the latest gadgets, made the conference a very worthwhile event to attend. The majority of the speaker's topics were very relevant to the field of hydrology/hydrography and highlighted the ever-advancing technology and methodology that we are seeing within our profession.

On Friday we headed out on a field trip to a number of hydrometric sites with some great commentary along the way. The first stop was the Thiess hydrographic test site at Brimbank Park where Thiess staff test an array of field equipment such as a rain gauge that looks like a rubbish bin positioned beside a public walkway (not surprisingly they do record high rubbish intensities at the site). A demonstration on the Q-boat and its inherent problems deploying it in flood flows provided plenty of fuel for discussion.

The middle part of the Friday field trip focused on bush fires and the effect they had on hydrographic sites situated in the Yarra ranges, as well as the rapid response needed in reinstating monitoring equipment. While on the bus we were shown a fascinating but morbid documentary on the 'Black Saturday' fires. The damage caused by these fires was mind blowing. I was amazed at how the Aussie bush recovers from these fires as you had to look hard to see any evidence of where the fires had swept through. Fortunately for us NZ field hydrologists, bushfires are uncommon and do not occur on the same scale as Australia.

The final stop for the day was Merri Creek where we discussed water quality issues and vandalism at urban flow sites. At this site a clever chute cum sleeve had been installed to accommodate a side looker. The chute enabled ease of cleaning and maintenance as the side locker could be simply slid out from its mount. On our way back to the bus, some stragglers provided an opportunity to duck into the local pub for some shots of whiskey to fortify against the cool Melbourne wind.

The conference and field trip provided a very valuable opportunity for people to network and showcase 'what's new' in the field of hydrology. If you get the chance I would highly recommend making the trip to the next AHA conference in 2014.

NZ Workshop

We might love to hate them in the cricket and the rugby, but New Zealand and Australian hydrographers have a very close relationship. Continuing with this linkage, by the time you read this journal, submissions for sponsored attendance at the NZ workshop will have closed with the winning entry due to be announced on 20 December (http://www.aha.net.au/news/2013-new-zealand-conference-competition/).
This is a fantastic initiative and the AHA congratulates the sponsors, Hydrological Services and Kisters and also the NZ Hydrological Society for waiving the workshop registration fee. I look forward to reading the successful entrant's workshop write up of the trip in the next journal.

Even if you are not eligible for sponsorship, but like the sound of a break in the Shaky Isles, the workshop details can be found at http://www.aha.net.au/news/2013-new-zealand-hydrological-society-nzhs-technical-workshop/.
The NZHS have specifically invited AHA members and offered to arrange post-conference activities. And I'm sure that you should also be able to arrange some financial assistance from the Australian Taxation Office for attending the event.

You might also like to watch this link for future NZHS workshops:
http://www.hydrologynz.org.nz/nzhs_workshops.php

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Waterways – 2011/12 Fact sheet

Melbourne Water is the caretaker of river health in the Port Phillip and Westernport region. In this role we manage:

- 8,400 kilometres of rivers and creeks
- 1,473 kilometres of drains
- 344 constructed waterway treatment systems and wetlands
- 300 monitoring stations on waterways and drains
- 157 urban lakes.

Key achievements 2011/12

- $26.2M invested in streamside works to protect and improve river health - removing weeds across 1,310 km, revegetating 281 km of land along waterways, and stabilising eight sites subject to erosion
- $2.56M provided under our Stream Frontage Management Program to support a record 725 projects on private property – constructing 107km of fencing along waterways to exclude livestock, and planting more than 246,000 native seedlings
- Funded 125 Community Grant waterway management projects totalling $590,000 and supported public land managers through 114 Corridors of Green projects totalling $969,000
- Met a 70% target for total community satisfaction with waterways (scoring 77%)
- Released full environmental water entitlements to rivers including 11 billion litres for the Thomson River and 5 billion litres for the Yarra River
- Yarra River was runner-up in the prestigious International River Prize
- Completed construction of a new weir at Dights Falls on the Yarra River
- Completed consultation on drafts of the Healthy Waterways Strategy (2013-18) that will be used as a guide to protect the environmental health of our waterways and the amenity they provide, making Melbourne a better place to live Total reservoir storage level increased by 14.2% – rising from 55.8% at 1 July 2011 to 70% at 30 June 2012 (first time storages have reached 70% since January 1998)

Melbourne Water also manages water supply catchments, treats and supplies drinking and recycled water, and removes and treats most of Melbourne's sewage.

State Government Victoria

Melbourne Water is owned by the Victorian Government. We manage Melbourne's water supply catchments, remove and treat most of Melbourne's sewage, and manage rivers and creeks and major drainage systems throughout the Port Phillip and Westernport region. Telephone 131 722 or visit melbournewater.com.au

Melbourne Water

Technical Reference Groups

Bill Steen
Australian Hydrographers Association

In September of this year, in my capacity as AHA chairman, I attended a day long Bureau of Meteorology Water Information Standards Business Forum (Forum) meeting, hosted by the Bureau of Meteorology (BoM). The meeting was held at the BoM Canberra office with representatives from every state and territory. Video conferencing played a major role allowing participants unable to travel to contribute via a video link. The ability to link Western Australia, Northern Territory, Queensland, Victoria and other state agencies via video conferencing worked exceptionally well.

A total of nine papers were presented addressing the following;

- Standards Terminology.
- Draft Endorsement Process.
- Hydrometric / ADCP standards project update.
- Draft Standards Activity Plan.
- WDTF development and support.
- Update on Standards Database.
- Water data quality code standards.

The papers were discussed at length with actions documented and allocated to various participants.

These actions included the formation of several initial Technical Reference Groups (TRG). For those that can remember, this concept is reminiscent of the old AWRC working committees. Therefore, the AHA has a major role to play in participating and actively becoming involved in the formation and ongoing contribution of the TRG that will evolve from this Forum.

Initially the Forum and the AHA see the need to establish or re-establish the following TRG;

- Hydrometric Standards.
- Acoustic Doppler technology.
- Value adding to data (including data quality).
- Hydrographic training.

So how will they work?

The AHA Committee have formed the following draft terms of reference for the TRG.

Background

The formation of AHA Technical Reference Groups (TRG) shall be established to focus on industry best practice and working procedures to improve the collection and management of Australia's water resources.

BoM is facilitating the Australian Water Information Standards Business Forum as part of its standards function under the Water Act 2007. The standards forum reviews candidate standards for endorsement as a water information standard.

TRG Purpose

The primary purpose of the TRG is to:

- *Submit candidate standards to the Forum for endorsement as best practice standards;*
- *Provide expert review of draft standards under consideration by the Forum;*
- *Endorsed standards will establish a national best practice that informs purchasers, providers and users of hydrometric services.*

TRG Role

As an industry peak body, the AHA plays a pivotal role in recommending the establishment and maintenance of Australian hydrometric industry best practice and working procedures. The AHA is actively engaged with the Forum. This engagement is aligned to goals and objectives of the AHA including:

a) To encourage the development of all aspects of hydrometric data collection, processing, analysis and presentation throughout Australia;

b) To contribute to the knowledge of, and encourage interest in Australia's water resources and management and utilization of such resources;

c) To provide a forum for the interchange of knowledge and ideas of a. and b. above; and

d) To represent the interest of all Australian hydrographers and support staff.

TRG Membership

The TRG shall be comprised of people with appropriate training or expertise in the field of activities specific to the TRG.

Each TRG committee shall have an AHA representative, who may or may not be the Chairperson.

TRG membership is voluntary, endorsed by parent organisation and should be product/brand independent.

Decision Making

The TRG shall have authority to make recommendations to the AHA and the Forum on matters consistent with its role and responsibilities and agreed Terms of Reference. The decision-making process of the TRG will be by consensus. If required all TRG members have an equal vote.

Meetings

The TRG will meet at least three times per year. Meetings may be held using teleconferencing or videoconferencing medium.

What does the AHA require now?

If you feel you have the appropriate training or expertise in the field of activities specific to a TRG and would like to become involved please send an email highlighting your experience in the relevant area and your willingness to participate to chairman[at] aha.net.au.

It is the intent of the AHA to also target key industry experts to participate on the TRG.

In the articles that follow are some details of the Hydrometric Standards, Acoustic Doppler and Data TRGs. The Hydrographic Training TRG has not yet been finalised, but will need to consider the AHA conference "Education Discussion Summary" described earlier in the journal.

International Involvement

After attending the Forum and holding discussions with Kevin Oberg from the USGS at the AHA conference it was obvious to me that the AHA needed to expand its horizons and look at what other countries / associations are doing. For many years there has been a very strong bond between Australia and New Zealand hydrographers. This bond has been beneficial in the exchange of ideas and technologies, but in reality it was not a formal arrangement and it was also obvious that we needed to look further afield.

Hence I contacted the North American Stream Hydrographers (NASH) to see if they were willing to form some sort of an alliance and extend the capabilities of the TRG through the sharing of knowledge from a global community. It was therefore a very pleasant surprise to find out that NASH have already formulated their own TRG and the topics being addressed were virtually identical to that of the AHA and NZ. After quite a bit of communication with NASH and NZ it was decided that we needed to combine forces and form an "umbrella" alliance association called the International Stream Hydrographers [ISH].

The primary purpose of ISH is to bring researchers and practitioners together into a community of practice for advancing the science of stream hydrography. The concept to achieve the goals of ISH includes representatives from each participating association to coordinate the interchange of information relating to the various TRG.

Through this interaction the ISH shall establish a medium to share information, improve collaboration between the represented associations, and develop technical reference material to share with the wider hydrographic community.

The ISH is not limited to the AHA, NZ and NASH. This is the first step to broaden the hydrographic community and the ISH would welcome participants from hydrographic associations in other countries.

The formation of the ISH is in its infancy and the AHA will be holding a committee meeting in December to discuss how we proceed.

From my personal point of view I think this is quite exciting to be able to exchange information in such an open manner on a global stage.

Hydrometric Standards TRG

Grant Robinson

If you attended the AHA 2010 conference in Perth, you would have heard my presentation describing the NSW Hydrometric standards (http://www.aha.net.au/resources/articles/aha2010/#robinson). The standards (access the project report at http://www.bom.gov.au/water/standards/projects/nswhydro.shtml) were developed by a team from seven NSW agencies.

During 2012, BoM (http://www.bom.gov.au/water/standards/projects/workshops.shtml) and AHA (http://bomconsult.aha.net.au/) facilitated national consultation. Following the process described by Linton Johnston and myself at the AHA 2012 conference in Melbourne, we need to collate feedback and undergo a second round of consultation, before presenting the work to the Water Information Standards Business Forum for endorsement as a national standard.

The role of the group is

- to review the feedback received from the consultation process conducted online and in workshops from March to May, and
- agree on which contributions to adopt in the final standards

The hydrometric standards TRG will be conducted by the AHA and invite participation from the membership across the nation, as well as non-member experts in the hydrometric discipline. The Forum has requested a final draft for its March 2013 meeting.

Acoustic Doppler TRG

Simon Cruickshank
Northern Territory Government

A previous TRG successfully developed a set of Acoustic Doppler Standards which were submitted to and endorsed by the Water Information Standards Business Forum. These standards have been predominantly or entirely accepted and implemented by most jurisdictions and many other Australian users of the technology. The intent of the Acoustic Doppler TRG is to build upon the work already performed but broadening the scope of issues associated with this technology. Whilst the exact terms of reference will be determined at the initial meeting, the AHA conference panel discussion focussed on deployment technologies, standards and procedures, training and data management and software.

As a result of these discussions, areas requiring further development include (but are not limited to) the following:

- Identify standard export field requirements from ADCPs to meet the requirements of gauging standard report.
- Identify standard requirements for the storage, access and integration of ADCP data into industry gauging databases.
- Provide feedback to suppliers of product enhancements required by the Australian industry.
- Identify enhanced training requirements and content for national ADCP training products.

Members who contributed to the previous Acoustic Doppler Standards TRG have been invited to continue their involvement. Other members who would like to nominate to participate in this TRG and meet the TRG membership requirements described earlier can do so by contacting:

AHA Chairman chairman[at] aha.net.au or
Simon Cruickshank simon.cruickshank[at] nt.gov.au

Data TRG

Paul Sheahan

This TRG has emerged in response to the 'Data' session at the AHA 2012 conference. The session's leading speakers clearly identified the value of hydrometric data for use both today and tomorrow.

It was also reflected in the titles of their papers:

- Water Information, a National Treasure.
- Why Data Matters - Surface Water Data as Assets.
- When the Data Hits the Road.

The discussion panel identified the value of data as being far and beyond the purpose of the original monitoring program. In order to maximise this value, we as data collectors need to consider our data collection activities to understand how to maximise the value of our data assets.

As our chairman has identified in this journal, this group will work to progress the objectives of the Australian Hydrographers Association constitution by working with the hydrographic community and the broader hydrometric data user community.

This TRG will investigate a broad range of approaches to value adding to hydrometric data. The different approaches will be evaluated in terms of their value to data users and their long term sustainability for collection. It is important to realise that data collection occurs, and will continue to occur, in a resource poor environment that will not adopt measures that are expensive or are perceived to have limited value.

Topics to be considered by the TRG include:

- Methodologies for describing data fitness for use.
- Objective assessment and reporting of data quality and reliability.
- Quantification and reporting of data uncertainty.
- Description of monitoring stations and their limitations.
- Assessing the impact of the original monitoring program purpose when considering data reuse.

It is envisaged that the TRG will consist of a core group who will solicit input from relevant experts. As there is an objective to have an impact on value adding to hydrometric data collecting activities, data collectors will need extensive input and consultation to ensure the TRG outcomes can be applied and sustained into the future.

This TRG will have a two year life and will need a diverse range of skill inputs such as those listed below, for varying periods:

- Literature researchers.
- Hydrologists.
- Hydrographers and Hydrographic managers.
- Uncertainty / statistical experts.
- Report writers, reviewers and editors.
- Pragmatists.

The issues being considered by this TRG are not unique to our continent, so relationships with international sister organisations will be important. These will ensure the outcomes have application beyond our shores and influence the tools we use.

The work will result in submissions to the Water Information Standards Business forum[1]. These may include a meta data standard which will apply to national hydrometric data collection activities. The work will be of value to data collectors when specifying contracts, will be an input to international standards efforts such as WaterML2[2] and may be submitted to the World Meteorological Organisation Committee for Hydrology[3] (WMO CHy) for consideration.

It is anticipated that this activity will kick off in the new year (2013) and will report progress to the 2014 AHA conference.

If you are interested in nominating for participation in the TRG, or would like to find out more information, please contact either:

AHA Chairman **chairman[at] aha.net.au** or
Paul Sheahan **p.sheahan[at] bom.gov.au**

1: http://www.bom.gov.au/water/standards/sbforum/index.shtml
2: http://www.opengeospatial.org/standards/waterml
http://external.opengis.org/twiki_public/HydrologyDWG/WebHome
3: http://www.wmo.int/pages/prog/hwrp/chy/index.php
http://www.wmo.int/pages/prog/hwrp/chy/chy14/awg.php

Hydrography as a Profession - Invisible No Longer

Stu Hamilton
North American Stream Hydrographers (NASH)

(Editor's note: This contribution has been kindly provided by Stu for inclusion in the journal. Although directed at the NASH audience, Stu's words help to put the AHA's announcement of hydrography being formally recognised as a profession into context. The content has been adapted to suit the journal. You can read more from Stu at http://www.aquaticinformatics.com/blog/author/stu_hamilton/)

Photo Credit: U.S. Geological Survey | Department of the Interior/USGS | U.S. Geological Survey/photo by B. Duet.

The Australian Hydrographers Association (AHA) has successfully convinced the Australian and New Zealand Standard Classification of Occupations (ANZSCO) to officially adopt hydrography as a profession (http://www.immigration.govt.nz/migrant/general/generalinformation/anzsco).

In Canada, 30,000 job titles are managed by Human Resources and Skills Development Canada (http://www5.hrsdc.gc.ca/NOC/English/NOC/2011/Welcome.aspx). Under the general category '2113 geoscientists and oceanographers', one could be one of 60 occupations studying earth science. Under '2114 - meteorologists and climatologists' one could be one of 14 classifications specifically for studying or forecasting the weather. Under '2255 - technical occupations in geomatics and meteorology' there are no fewer than thirteen different classifications for observing some aspect of the weather.

To find a title for Hydrographic engineer, technician or technologist one needs to dig deep into '2212 - geological and mineral technologists and technicians'.

I don't think many of us in surface water monitoring would self-identify with this group employed by 'petroleum and mining companies, consulting geology and engineering firms, and by governments and educational institutions as well as by a variety of manufacturing, construction and utilities companies' and work in the 'fields of oil and gas exploration and production, geophysics, petroleum engineering, geology, mining and mining engineering, mineralogy, extractive and physical metallurgy, metallurgical engineering and environmental protection'. There is a distinction between a 'sea-floor technologist' and a 'sea-bottom technologist' in this category which leads me to think that the hydrographic titles actually refer to ocean hydrography. The context provided for hydrographer job titles clearly does not reflect the work of stream hydrography.

In the US, the Department of Labor manages 8,446 job titles in the Standard Occupational Classification system http://www.bls.gov/SOC/. Hydrologists 'Research the distribution, circulation, and physical properties of underground and surface waters; and study the form and intensity of precipitation, its rate of infiltration into the soil, movement through the earth, and its return to the ocean and atmosphere.' So, apparently, hydrologists do not directly measure or monitor water. There is no description of the work of ensuring the data required to manage our most vital natural resource is properly created and curated.

Preliminary results from a recent industry-wide survey indicate that the complexity of stream gauging is increasing with more parameters monitored, more sophisticated technology in use and increased demand for improved quality management and timeliness. The size of monitoring networks is expected to increase substantially resulting in a need for many more stream hydrographers over the coming decade.

Jeff Watson of Horizons Regional Council has been working on getting hydrology officially recognized as an area of skills shortage within New Zealand. Having hydrography officially classified as a career should help the process for getting skilled foreign hydrologists/hydrographers into New Zealand. This application for recognition as an employment category was declined due to the perceived lack of numbers in the industry. However, the existing Environmental Research Scientist category can, with careful wording of an immigration application, be utilized for employment in the hydrography industry.

According to Simon Cruickshank, the Water Monitoring Manager for the Northern Territory of Australia, the Australian Bureau of Statistics will now be able to audit and report at a national scale of metrics such as: Number of advertised vacancies per annum, How many vacancies were filled, Success rate for advertising, number of foreign applicants employed, hydrographer demographics, and statistics on hydrographer qualifications.

Bill Steen, chairman of the AHA, thinks that the new ANZSCO classification will open doors for things like funding and employing internationally. We need to catch up in North America.

Measuring and monitoring water resources is one of the most sophisticated careers there is.

There are few, arguably no, other careers that can match stream hydrography with such a broad spectrum of applied skill, theoretical knowledge, analytical ability as well as individual resourcefulness requirements. I challenge anyone to find any career from the thousands of 'officially' titled jobs that is more fundamentally important for sustaining both a robust economy and healthy environment, that requires more diverse and highly specialized skill requirements, with less recognition or institutional support.

How is it that we are so invisible? There are a lot of us.

My theory is that it is that in order to be where we need to be to do our jobs well we are very thin on the ground. Institutional barriers contribute as well. Hydrographers have little interaction with other hydrographers outside of their own agency but they only have a small presence in any one agency.

The work is too complicated not to have a coordinated approach to training and accreditation. The majority of respondents to the industry survey indicated that they get their training either in-house or self-taught using Google and Wikipedia. There is some good material on the internet but I have also found information related to hydrometry that just makes me cringe. An alignment of North America with Australia and New Zealand in recognizing hydrography as a profession will go a long way toward the eventual development of industry-wide standards for training including collaboration on the development of curricula, content and accreditation criteria.

This will improve data collection world-wide.

The quality of data will be a function only of local environmental challenges not of local operator competency. Efficiencies will be achieved with more effective transfer of knowledge. Time and resources now spent on trial and error approaches will become available for more productive activities. Recruitment will increase as students will be able to clearly identify an exciting, challenging and rewarding career path.

One small step in a bureaucratic process may lead to a giant leap for water data availability.

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DATASIGHT

ENVIRONMENTAL
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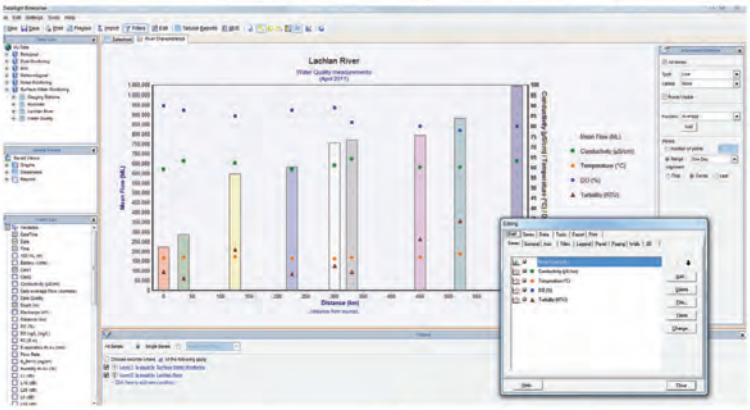

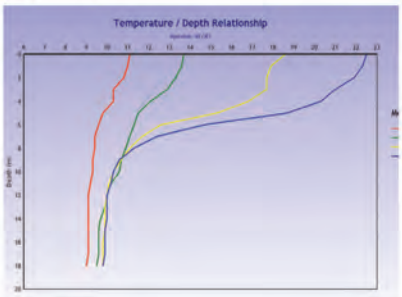

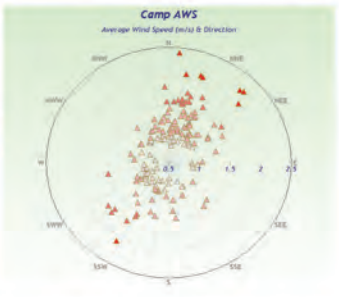

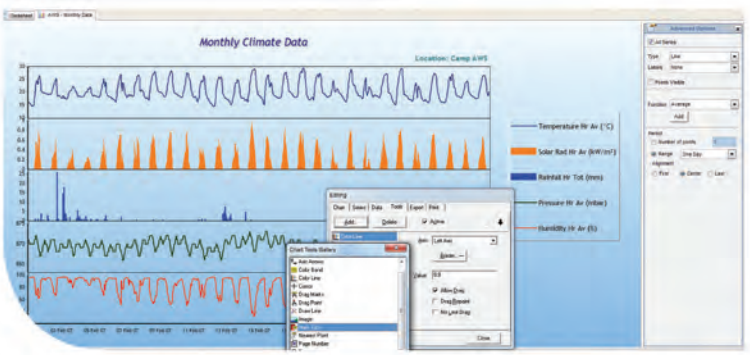

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25 years
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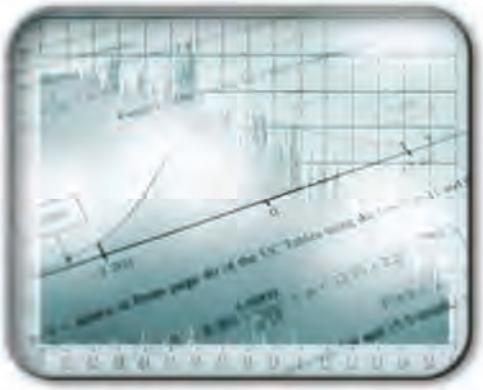
KISTERS' has been providing environmental data management software solutions since 1987. KISTERS' core business is the implementation of data management systems for environmental, hydrological, air quality and energy disciplines.



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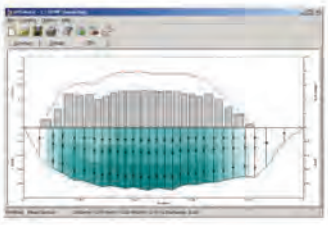
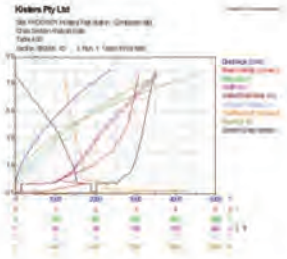
- Hardware and software telemetry systems for surface water, ground water, water quality and meteorological stations
- Software and engineering services that range from the development of specifications and system analysis to software installation, training and maintenance





KISTERS

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Q-Boat Evaluation

Anthony Belcher (anthony.belcher[at] water.nsw.gov.au)
NSW Office of Water, Maitland

Introduction

The Oceanscience Q-Boat 1800 is a remotely-operated electric boat designed to make safe, unmanned measurements of currents, bathymetry, and discharge with an Acoustic Doppler Current Profiler (ADCP). The rugged, lightweight hull is constructed of high-impact UV-resistant ABS. The boat's powerful outdrives are capable of reaching speeds up to 5 m/s and the efficient V-bottom design produces smooth, predictable, agile handling even in choppy waters. The large watertight electronics compartment is spacious and easily accessible. Two people can easily handle the boat and it can be transported in a 4X4 ute, SUV or some cars.

NSW Office of Water received four Q-Boats in 2011 and has tested the units in limited situations. Most of the initial testing was carried out at a dam site where a number of speed tests and evaluations were carried out.

This evaluation was undertaken as part of a Bureau of Meteorology funded project to expand the use of ADCP and permit more accurate flow measurements and safer gauging of rivers.

Specifications at a Glance

Typical Cruising Speed	4 m/s
Top Speed	5 m/s
Hull Length	1800 mm
Hull Width	900 mm
Battery Endurance – Top Speed	45 minutes
Battery Endurance – Cruising Speed	45-140 minutes
Payload	13 kg
Power	24V NiMH Packs (3)
Motor	Brushless DC Outdrive (2)
Hull Material	UB Resistant ABS
Weight	25 kg
Hardware	Stainless Steel
R/C Control	Futaba 6-channel
Remote Antenna	Omni Directional
Remote Range	300 m
Remote RF Scheme	FHSS
Remote Frequency	2.4 GHz
ADCP Size	5-22.5cm diameter

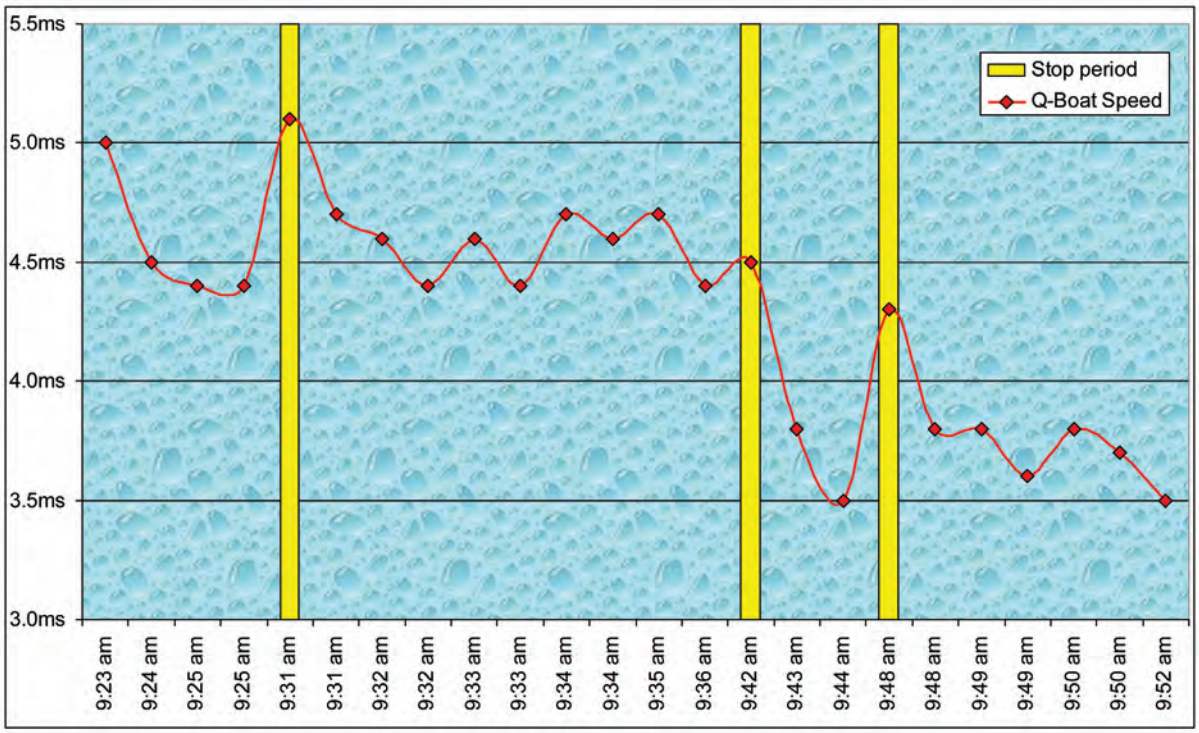
Results

Initial Speed Tests

Initial speed tests at the factory showed (mean of 3 x 100 m runs):
S/N: 224 4.72 m/s
S/N: 225 5.18 m/s
S/N: 222 5.40 m/s
S/N: 223 4.96 m/s

After extensive testing of each unit on a dam with light winds and no pay load, we found that in most cases units could reach a maximum of 5 m/s only for a brief initial period on freshly charged batteries. The maximum speed depleted over time. A typical analysis of a Q-Boat speed over time can be seen in figure 1.

Figure 1: Typical speed vs time Q-Boat s/n 233



Observations from the tests include:

- Batteries were charged overnight.
- Voltage metered at 28.1 - 27.9 V DC for the three battery packs prior to the dam test, after being removed from the charger for 15 mins.
- Each unit had a high initial observed speed, and the boats planed well.
- Both observers noticed a drop in speed after about three mins.
- A quick check of each vessel confirmed that propellers and boat base were free from drag or debris.
- Again, observers noted a quick initial speed which then declined.
- After extended runs, boat speed declined, and then speed surged initially after a break. This change was attributed to the battery temperature, and high output current to the motors; the break period allowing the batteries to cool and recover slightly, before heating again. Batteries were warm (to hot) to hold after removing from vessel post use.

The speed tests were carried out over a set length course and each pass was timed. The unit was at continual full throttle except when on a break indicated in figure 1 by the yellow areas.

Figure 2: Q-Boat speed test in action

In the field

To date, the Q-Boats have been used in a number of different situations including floods with velocities of greater than 3 m/s. Limited high flow events had prevailed during this formal evaluation, however further gaugings have since been conducted in high flow situations obtaining very favourable results. They have also been used to carry out a number of bathymetric surveys of small dams in conjunction with the depth sounding Sontek M9 and an RTK GPS unit.
The Q-Boats have been used quite extensively in the Hunter region of NSW and are now being operated by many hydrographers across the state with excellent results. The benefits and limitations of the Q-Boat in the field found the NSW Office of Water are listed below.

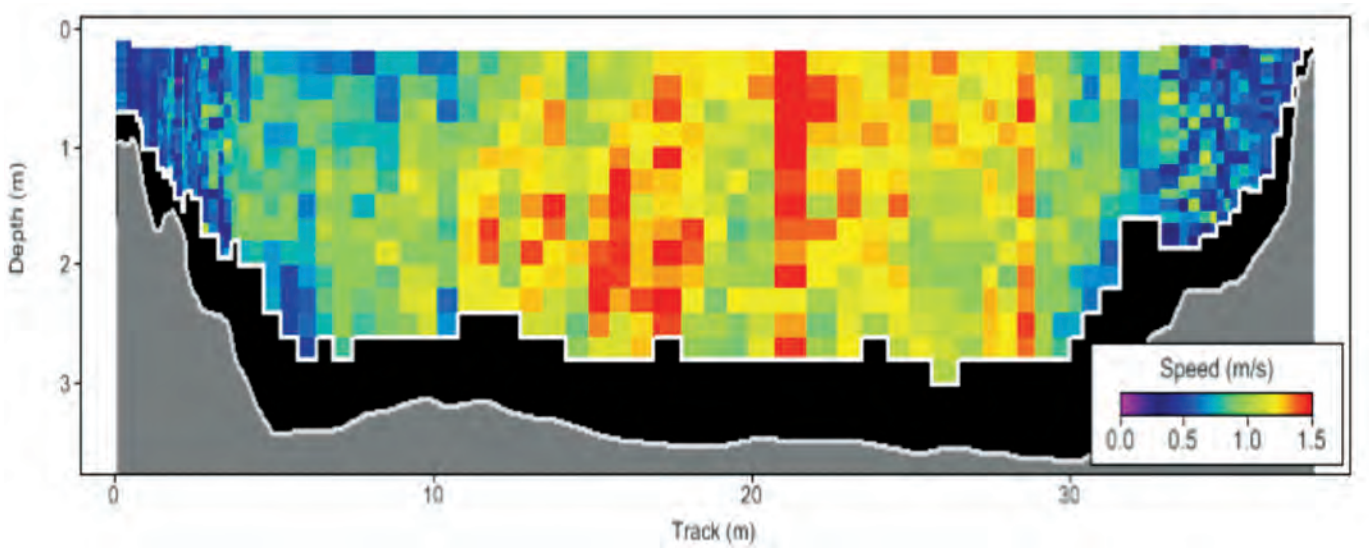
Benefits

- Ease of deployment. Once set up and ready to go the Q-Boat provides a fast and efficient method of getting flow measurements at our sites.
- Work Health &Safety. Obviously the major benefit of not having to enter the water in extreme conditions, setting up cableways and working from busy bridges increases the safety of hydrometric staff.
- After the reprogramming of the remote control unit, the Q-Boat is easy and intuitive to control with very little training or time of use. The unit is very easy to operate, especially in higher flow situations as it tacks across each transect with ease.
- The battery life was more than adequate for two or three gaugings in most conditions encountered in the western streams. In coastal streams where velocities are greater than 4 m/s, the Q-Boat would be reduced to only one gauging depending on running time. A spare set of batteries was also purchased for each Q-Boat, thus extending its use over a full day's gauging.
- As well as high velocity environments, the Q-Boat is equally effective in low flow environments (<30 cm/s), providing a total solution to river discharge measurement.
- The Q-Boat does not appear to affect the accuracy of the measurement in any way. In a comparison of different flow measurement methods, there was little to no difference.
- Boats can be used for other purposes including bathometric survey.
- Launching the Q-Boat is a two person operation. After launching one person can operate the boat from the safety of the river bank.

Figure 3: The Q-Boat in the field at Nowendoc River @ Rocks crossing 17/06/2011 Q= 22,000 ML/d @ 4.23 m

Figure 4: Relative size of the Q-Boat – Hunter River @ Aberdeen

Figure 5: Sample data from M9 ADCP mounted in the Q-Boat 210079 Paterson River @ Gostwyck Q= 8,800 ML/d. River Gauge= 3.9 m



Limitations

- The physical size of the unit is quite large and can be cumbersome to transport and handle. An aluminium box has been fabricated with padding to house the boat while in transit or not in use. The box can be carried on a roof rack or in a small trailer.
- The edge estimates for the opposite bank are hard to accurately judge, especially for a transect that is over 50 m in length. The use of a range finder allows greater accuracy in the estimation of edges, and should always be used when using the Q-Boat.
- There is possibly some interference of the Q-Boat with the operation of the M9 ADCP compass. This was only detected in a small number of gaugings. On several occasions quite extensive efforts were required to get a compass calibration that did not have a high level of interference. This can be reduced by shielding the electronics and batteries. Further testing of this possible interference needs to be carried out. It is envisaged that the solution to this compass problem is to use a GPS derived compass heading.
- They are quite expensive, especially when the M9 is included in the package. There may need to be some sort of GPS tracking device attached to the unit in the case there is a failure and it washes downstream. This is currently being investigated.
- The batteries have a relatively limited life, especially in higher flow environments. A spare set of batteries should be carried at all times when using the Q-Boat in these environments. We are looking at trialling lithium batteries in the future. These are both lighter and more powerful than metal hydride batteries.

Conclusions

The speed of the unit will enable hydrographers to gauge streams in most circumstances. From very low velocities to extreme conditions greater than 4 m/s, the Q-Boat will provide good results with the added safety of personnel avoiding dangerous, high flow environments.

The units have been programmed to support relative ease of use and incorporate a failsafe feature for when the boat loses communications. The range of 300 metres is adequate for most gaugings with distance of sight being the major issue before losing range and control.

The units are quite rugged and should withstand most bumps and impact with the bank, debris etc.

The initial cost of the Q-Boat is quite high (approximately $25,000). Coupled with a Sontek M9 ADCP the combined cost is about $60,000. A GPS locating device will enable hydrographers to track the unit if it is lost.

I would recommend the deployment of more Q-Boats throughout the hydrometric network. They will increase our ability to safely and easily obtain flow measurements not easily achievable using current methods.

References

Oceanscience Group, Q-Boats. http://www.oceanscience.com/products/q-boats/ accessed 27 November 2012

Oceanscience Group, 2011. Q-Boat 1800 User Guide. V2.1.0, 26 August 2011 http://www.oceanscience.com/Knowledge/Freshwater.aspx accessed 27 November 2012

Hydrography Working Environments

Frank Davies
Department of Water, WA

Hydrographers work in a wide diversity of environments in their occupation:

- the bush and the city;
- underground (caves and sewers) and above ground;
- hot and cold;
- humid and dry;
- on ladders and platforms and wading in water;
- high mountains and deep valleys;
- on water in boats and sometimes under water;

… let alone the rain and storms. Sometimes these environments are pleasant, but sometimes not, making the office and its reverse cycle air conditioner very attractive at certain times of the year. However, I'm sure that variety of environments is one of the reasons that make the job interesting.

In the "wheat belt" of south western Australia, salt presents another hydrographic working environment. Western Australia's wheat belt salinity problems have been widely researched and documented. Average rainfall in the region decreases from 400 to 250 millimetres per year in a general west to east direction. Clearing of the natural vegetation for pasture and cereal crop growing from the 1900s caused groundwater levels to rise and release salts that had been held in the soil profile. Wikipedia http://en.wikipedia.org/wiki/Salinity_in_Australia does the subject better justice than my brief description.

One of the Western Australian catchments affected by this salinity is the aptly named Salt River, a tributary of the Avon River which ultimately flows into the Swan Estuary past the capital, Perth. Although the river has a huge catchment, in most years the low winter rainfall causes minimal and sometimes no outflow. High flows generally only result from tropical depressions that are the remains of cyclones that have crossed the coast well to the north of the state. Water in the gauging station (615022) stilling pool is almost hostile. It is generally hyper saline, with recent values ranging from 60,000 to 160,000 mg/L.

Apart from the possibility of flooding, the gauging station's main purpose is to manage the release of the saline water from the river. Gates positioned at the station's road crossing control prevent water leaving the catchment during low flow years – the gates are just visible in this photograph of the last high flow in January 2000. Water is only released when there is sufficient flow in the mainstream Avon River immediately downstream of the gates. This way the "shandied" water is less likely to cause environmental damage and nuisance smells as it passes through towns downstream.

Immediately upstream is Yenyenning Lake which locals use for water skiing. If the lake water level is too high it will also inundate useful pasture land. Too low, and no recreational facility is available. The lake system is also an important site for bird breeding. If water levels are too low, islands within the lakes used by the birds become accessible to predatory animals such as foxes. Release of the water is coordinated by a community-based management group with advice from the Department of Water and the Department of Conservation.

Gates (open in the picture) controlling water releases into the Avon River.
(Yes, that's salt on the banks, and that is after much of it had been flushed away.)

The gauging station is unrated, reporting just the lake water level. Flow rates from releases are determined indirectly using rated gauging stations located on the Avon River both upstream and downstream of the Salt River confluence. A similar calculation is used to work out the salinity of shandied waters in the Avon. Until recently an EC probe was operated at the gauging station but this was not representative of the lake due to stratification and virtually no mixing occurring. Both the float well and EC probe have proved difficult to operate with salt deposits blocking inlets and clustering around the EC probe.

How bad does it get? Take a look at these photographs.

Salt crystals in the stilling pool.

A section of inlet pipe covered in crystals.

And then there are the flies, the wind, summer heat and winter cold to deal with.

Cartoon by Greg Jones, Technical Officer SA Water, Mount Gambier, SA.

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The One Sided Wing Nut

Mighel Chivilo
Department of Water WA, Geraldton

It looked like it was going to be a lovely day. Phil Correll and I were visiting the Hill River station just outside of Jurien Bay to conduct some surveying, obtain a DM and do a quick station visit. While it had been raining the night before the sun was now out, spring was in the air and we were surrounded by some green and pleasant bush/river settings.

While Phil was setting up the survey gear I grabbed the Toughbook and climbed the float well platform to carry out a quick station visit. Opening the door to the float well I was confronted by a mass of brown, fuzzy, buzzing angriness about a foot from my face. Having built their hive inside the float well and up against the door I had just ripped off a side of their house and the girls weren't happy. The photo below shows the location.

Body reacted faster than the brain (probably due to pain) as I had only managed the thought "what the ....." while I leapt off the 2 metre platform to hit the ground running. Retreating to the car I was fully prepared to loop around and take a plunge into the Hill River to escape my pursuers but seeing that I had lost the swarm I ducked into the safety of the car. Phil, having seen me leaping and flapping about like a panicked chicken, had deduced that something unpleasant was chasing me and had already beaten a retreat to the car. Once inside we managed to chase out the last of the bees and then I was able to remove bee stings from my shin and right ear.

Surveying the situation outside we had an opened float well with a large bee hive sitting in the entrance, lots of angry bees and a laptop sitting on the platform floor. We couldn't continue our visit nor could we leave everything as it was so we headed into Jurien Bay to find a solution. I was all for buying a few flea/bug bombs and lobbing them through the float well door having discarded my motto "Live and let live" for "An eye for an eye" but my throbbing ear was a reminder that that might not be a good idea.

We managed to track down a bee removal specialist. Apparently, Jurien Bay was being inundated with swarming bees and we spent the next 1 ½ hours lolling about on the foreshore, coffees in hand waiting for the bee man to turn up. On arrival, he followed us out to the station where from the safety of our windows-up car we watched him remove the hive. I was slightly disappointed that I wasn't going to witness a bee genocide but he wanted to keep the bees for his apiaries and so cut down the hive and put it in a cardboard box for transportation. He told us that if he left the box there till the next morning pretty much all of the bees would be in it and he could take them away. Otherwise, he could take the box now but that would leave a large number of very angry bees still hanging around the area. In either case, it wasn't going to be safe for us to hang around the station so we called it quits and headed home.

Later that night the throbbing pain in my shin and ear subsided and became replaced with an annoying, slightly painful itch. My right ear also turned a bright red and swelled up so that I resembled ..... ***a one sided wing nut!***

Pluvio Enclosures

Mark Williams
Department of Water WA, Bunbury

Many of the pluvio fences in our region are getting old and showing signs of falling apart due to stock damage, the passage of time and the elements. A possible replacement using portable stock yard fencing is now being trialled at three sites.

The stock panels were made to order from a firm in Bindoon. The design was a modified sheep and goat panel with one side hinging to form a gate, which is secured with a chain and can be locked if required.

The cost was about $420 for each enclosure including the four sides, hinges and bolts. The freight component would have to be considered depending on distance.

Early indications are they seem to be neat and easy to install. The metal is galvanised tubing and the welds are painted with cold galvanising. Time will tell if they will be durable and whether stock will be able to damage the panels.

For more information visit
http://www.withnellstockyards.com.au/products.php

Right: Chapman Hill pluvio and Neon system in its new enclosure.

Left: Close up view of the hinging and corner brackets at George Road pluvio.
Middle, Right: Sandalwood site constructed on sloping ground.

AHA Conference Field Trip

Photographs by Michael Wheaton (Thiess), Peter Heweston (Kisters), and Krystal Hoult.

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