Australasian Hydrographer

March 2012

Unseasonal gauging in south-west WA

AUSTRALIAN HYDROGRAPHERS ASSOCIATION

AHA

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Contents

FRANK DAVIES

Editor's Introduction

With the August 2012 AHA conference date rapidly approaching I sense that many of you are either directly involved or making plans to attend. This is a big event for the AHA, its members, and the organisations that support it. In the meantime there is still work to be done. Here are some insights into the content in this journal.

The workings of the AHA committee are often unheard. With our recently appointed secretary, Krystal Hoult, now settling into the role, she has some feedback on this subject with her secretarial update. Paul Langshaw also has some encouraging news regarding the Hydrography Diploma. Glenn McDermott again provides some thought provoking concepts on gauging uncertainty, particularly in relation to pipe and sewer gauging. South-west WA river flows (front page) pale into relative insignificance with what has been happening in the south east of Australia recently. However, the unseasonal summer weather caused a bit of excitement late last year giving the opportunity for two of WA's female hydrographers to wave the flag for equal opportunity. And, what about some of you in the "bigger" states telling us about your experiences in deep waters? On a technical front, Neil Chapman reports on field trials of a new satellite service for IP logger data transfer. This article matches up with one of our corporate advertisers, Unidata, who provided Neil with the trial equipment. Whilst there is a certain degree of commercial conflict with this, I believe that it is of direct value to the membership to hear from both sides of the equation when new equipment becomes available. Finally, a familiar name, Alex Springall tells us how to recycle old wooden gauge boards using woodworking skills.

Conference Registrations Open

If you are attending this year's conference in Melbourne, registrations are now being processed
http://www.aha.net.au/events/aha-2012-conference/registration/

PAUL LANGSHAW

Water Operations – Hydrography Diploma update

Hi to all from the training desk.

I apologise upfront that this article is brief, but I am recovering from recent shoulder reconstructive surgery and my left finger typing is laborious.

Below you will see the contents of a recent email to the AHA Committee from Scott Walker, the OTEN hydrography teacher. Late last year, the AHA Committee wrote to OTEN expressing concerns on what was perceived by its members and industry alike as delays to delivery of the Water Operations - Hydrography (diploma) course. These concerns were mainly based on the fact that OTEN purchased and received the learning material over 12 months ago. I must stress these concerns are no reflection on Scott Walker's commitment and achievements to develop this material for delivery.

Due to theses delays, the AHA has been pursuing the possibility of delivering the course through another RTO as an alternate option to members. The AHA is well down the track with discussions and anticipates this will be available by late June this year. It is proposed that delivery will be by a mixture of distance and blended delivery as opposed to OTEN's distance learning delivery. It is also proposed to provide a much more streamlined and "user friendly" RPL process.

Briefly, blended delivery will be (weekly) sessions of computer links with the trainer, providing a forum for students to interact with trainers and other students, as well as keeping a scheduled completion of assignments.

Over the next month I hope to provide more information on this option.

As you will notice from Scott's email, OTEN now believes it is close to providing the units from this course.

Please don't hesitate to contact me for any clarifications:
Email: training [at] aha (dot) net (dot) au or
Phone: 0419 266 299

Scott Walker's email

Here is the state of play at OTEN as of March 2012.

The diploma course consists of two core subjects that must be undertaken.

PSPSOHS501A *Participate in the coordination and maintenance of a systematic approach to managing OHS*
NWP505B *Implement and manage environmental management policies, plans, procedures and programs*

These core units are both ready for enrolment now and I usually enrol the students in these first.

Four electives units must be undertaken to complete the course.

NWP508A *Pipe and channel flow*
100% ready and we can take enrolments now

NWP509A *Collect, verify and report hydrometric time series data*
100% ready and we can take enrolments now

NWP510A *Develop and maintain Rating tables*
100% ready and we can take enrolments now

NWP504A *Collect and manage hydrometric survey data*
In development but **open to enrolments**. There is development in the delivery product format but we would not preclude students from enrolling if it was to detrimental to their progress through the course.

Note that one of the units taught at the Hydrography basics course can be supplemented for one of the above elective units.

NWP420 *Install, operate and maintain hydrometric instruments and equipment*
Can be substituted for either NWP504A, NWP508A, NWP509A or NWP510A

To complete the course students should complete one project from a choice of two project keystone units after completing the above units.

NWP520 *Contribute to hydrometric planning and water resource management*
In development but **open to enrolments**

NWP525 *Implement and manage asset construction and maintenance*
In development but **open to enrolments**

Students can apply for RPL (recognition of prior learning) at any time in any of the above units. There is no need for course material if applying for RPL.

It should take the average student two years to complete. i.e. $2616 for two years enrolment.

KRYSTAL HOULT

Secretarial Update

December 2011 Committee Meeting

The thoughts and comments from members following the notification of our last formal meeting were invaluable and very much appreciated. Thank you again to those members who took the time to respond. The committee will continue to inform the membership prior to upcoming meetings in order to allow individual members an opportunity to add to the proceedings.

Issues raised by members included content distribution, clarification of the requirements to become a "Certified Hydrographer" and how this new registration process fits in with the existing training on offer and the new diploma course. These issues were discussed and addressed by the committee with those members who raised them receiving a reply directly. However, a summary response is included below for general interest.

Content of a commercial nature, technical papers and other interesting pieces of information are by and large invaluable for presentation in the journal. However, should you desire to distribute content outside of this medium there is an articles section on the website available for utilisation http://www.aha.net.au/resources/articles/. Content that you may wish to display in this section of the website can be forwarded to myself (secretary [at] aha (dot) net (dot) au) allowing review by members of the committee prior to posting, as per the current process with all journal and web material.

Following our December meeting Paul Langshaw and Bill Steen put together a comprehensive document summarising individually, as well as the links between, the registration process, existing training courses on offer and the new diploma. This document has recently been distributed to hydrology managers throughout Australia for review and comment.

Membership Database and Processing

As many of you are aware our previous secretary, Michael Whiting, has continued to assist the committee in processing membership applications, managing the membership database and several other tasks while I have settled into other aspects of the role of Secretary. The aim was for Michael to manage a move of the database and membership to a web based system. However, due to factors outside of our control this has not been possible to achieve within a reasonable timeframe.

As such Michael is currently in the process of handing over the existing Access database membership system and his outstanding tasks to me, including the movement of the existing database to a web based system. Over the next month or so Grant Robinson and I will be reviewing options for a user-friendly, clean, professional, online membership service which will allow for the growth of our membership and be adaptable to future change. i.e. will not date easily.

I have appreciated the assistance I have received from Michael since August last year. So, thank you again Michael. It is only once you take a walk in someone's waders that you truly appreciate what they do!

Job Advertisements

As a service to members, hydrological organisations are able to advertise vacancies on the AHA Website. Though there is no direct additional cost for this service, those agencies and companies utilising it generally maintain a corporate membership with the AHA.

Jobs can be posted by notifying the Secretary, ideally no later than one week prior to the advertising of a position. This provides sufficient time for website updates to be made and notification emails to be sent out on, or just after, the posting date. Your posting should include a brief position description, salary and other relevant details for posting on the website, along with any associated internet links for application packs.

How much use is made of this facility? The following statistics have been extracted for recent years.

Summary of Jobs Advertised

http://www.aha.net.au/careers/

Year	Total	Jan to Mar
2012	6	4
2011	36	3
2010	22	5

Is Pipe Gauging Really So Inaccurate?

Glenn McDermott
Greenspan

Hydrography includes pipe gauging as well as river gauging. This is for irrigation systems, storm waters and sewers. In sewers there is a substantial budget for flow gauging and recording to develop remedial plans to abate wet weather overflows. Computer models of the pipe system are used to do this. These models are of course calibrated to the depth, velocity and flow rate data recorded at 5 or 15 minute intervals, from fixed in place doppler or transit-time velocity and depth sensors.

None of the velocity sensors cover the whole cross section area, so they need to be calibrated in the field to define the adjustment factor to apply to get average cross section velocity. Effectively the discharge data calculated from the sensor velocity and depth readings, are as accurate as the field calibration method used to define this average velocity factor.

In smaller pipes (say less than 1m diameter) the most common gauging method used to calibrate sensors is at best to get 3 verticals with a hand held current meter, and usually only at one point per vertical (i.e. 0.6D), if the depth is deep enough to allow this. More often than not, in shallower depths, only one vertical is able to be taken, and only one point in that vertical (@0.6D).

In larger trunk sewers (say 3-4m wide) it is possible to get 5 verticals, each with 2 to 3 points per vertical (i.e. 0.2D, 0.6D and 0.8D).

If no money was being spent as a result of the computer modelling, then there would not be much interest in the question “is pipe gauging really so inaccurate?”. But in Sydney alone the amount of expenditure on remedial abatement works is huge, in the order of billions, spread over decades.

AS3778, our industry “bible” was written to suit river gauging, and not sewer pipe gauging. For example, if we attempted to use AS3778’s measurement uncertainty calculation method to define the accuracy of average velocity (or discharge) gauged, for a typical site with, say velocity of ~ 0.3 m/s, and just look at the component due to number of verticals alone, we can extract the relationship from Table E.6 (from AS3778 Part 3.1), and plot it as shown in Figure 1.

This basic lookup table relationship “starts” at 5 verticals and covers up to 45 verticals. Anything more than 20 verticals gives you a measurement uncertainty of better (lower) than ±5%, which is why our work procedures usually ask us to use at least 20 verticals. If we use as little as 5 verticals then the measurement uncertainty of that gauging will be at least ±15%.

If we fit a power curve to these points and extrapolate backwards for lesser numbers of verticals (such as used in sewer pipe gauging), then we get even higher measurement uncertainties for less than 5 verticals, as shown in Figure 2:

- ±82.5% for 1 vertical only
- ±41.7% for 2 verticals
- ±28.0% for 3 verticals
- ±21.1% for 4 verticals

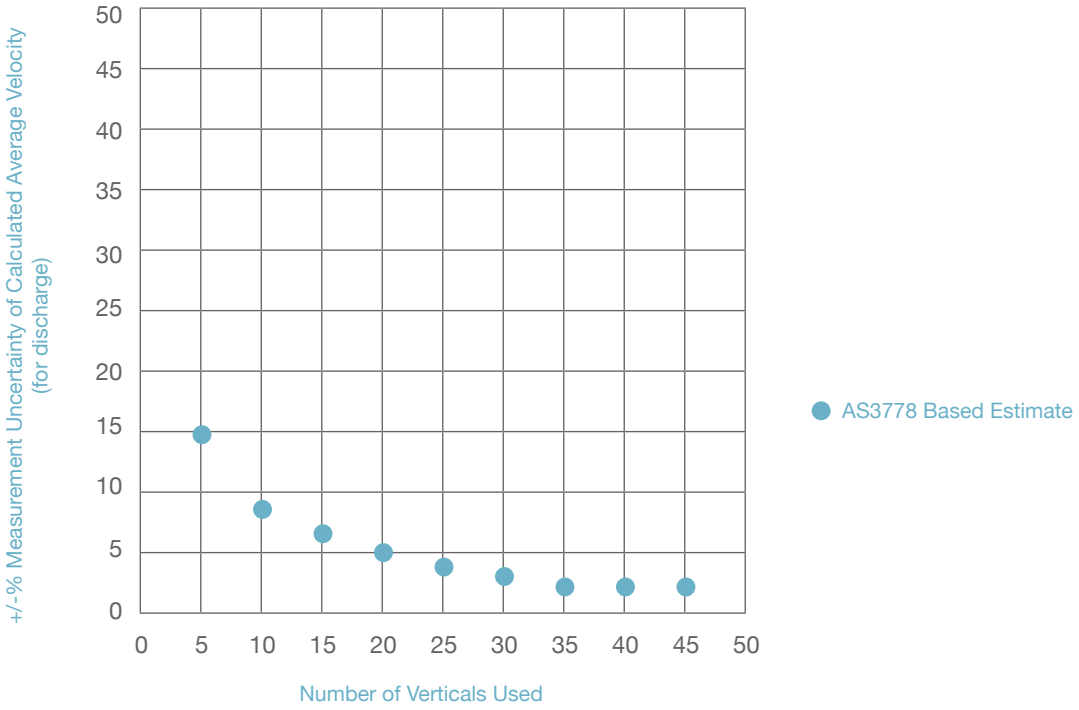


Figure 1 Measurement uncertainty versus number of verticals (from AS3778 Part 3.1 table E.6)

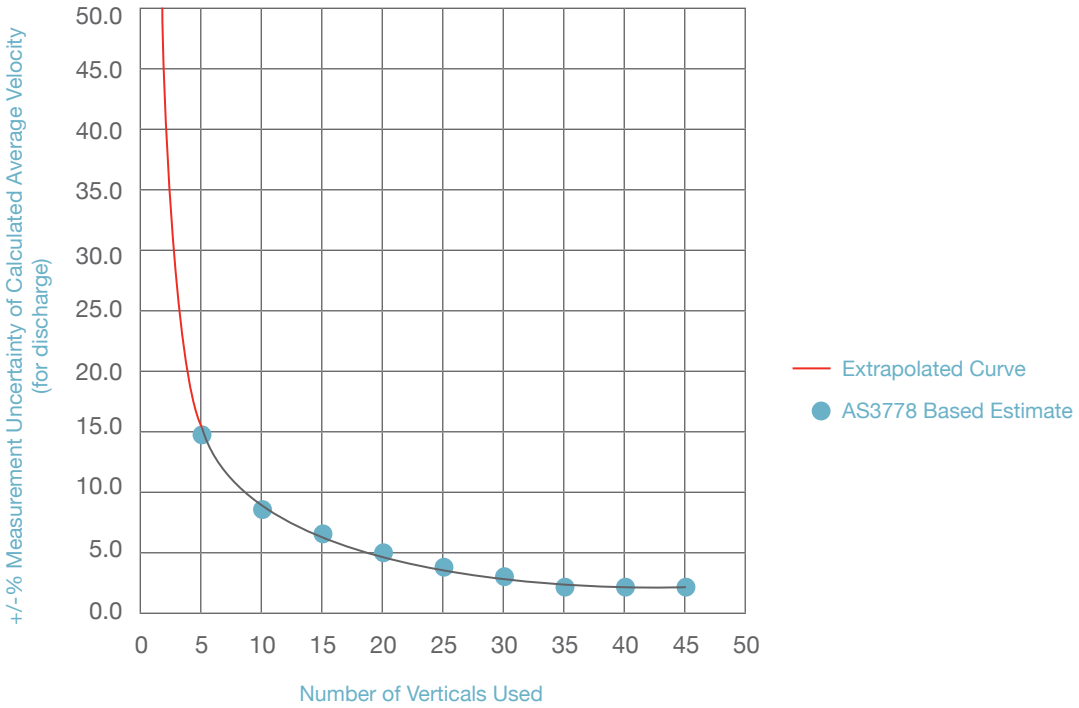


Figure 2 Fitted curve and extrapolated portion for less than 5 verticals

Imagine that you are the water authority paying for the gauging network and the gaugings, as well as paying for the computer modelling based on this data. What would you think if you were told that the accuracy of the data from most of the small pipe sites is no better than ±82.5%? A logical response would be to stop the programme, or at least search urgently for a more accurate calibration method.

To make this worse there is also the issue of the exposure time of the current meter in the flowing sewer.
In AS3778 the measurement uncertainty component for exposure time only goes as low as 30 seconds and gives typical measurement uncertainty at this short exposure time of ~ ±50% on sensed point velocity. In sewers, because of debris fouling the current meter reading, exposure times have to be limited to from 10 to 15 seconds. This implies that point velocity accuracy for such gaugings will be substantially higher than ±50%.

However the exposure time issue is not the subject of this article. What is being questioned is the validity of relating discharge (or average velocity) measurement uncertainty to number of verticals alone, regardless of what % of the cross section is covered by the "point" velocities taken, and regardless of how more or less predictable the pattern of velocity is.
Experienced hydrographers with extensive sewer pipe gauging experience have noted that in pipes the pattern of velocity is a lot more predictable than in large river cross sections. Also they have pointed out that the % or portion of the wetted cross section in the pipe covered by the current meter may actually be similar to a 20 vertical gauging across a typical river channel. The purpose of this discussion item is to explore this aspect.

First take a look at a typical river channel cross section, like the one below.

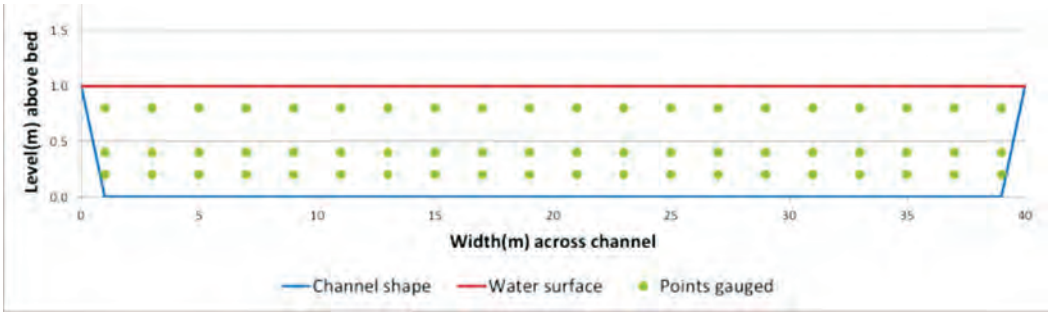


Figure 3 A typical river gauging cross section – and points gauged

The standard current meter fan is approximately 100 mm in diameter. In fact what we call the "point" velocity at any gauging point, is really the average velocity in the fan sensing zone, which covers an area of 78.5 cm2 (or 0.00785 m2). If we continue along this line of thinking then the portion of the above typical river channel which is covered by the 3 points over 20 verticals is 0.47 m2 (i.e. 60 points) over the 39 m2 wetted area of the cross section. This amounts to 1.2% of the area.

Repeating this calculation for smaller and larger river cross sections (with the same proportions) defines the relationship shown in Figure 4, for the following cross sections:

- 0.3 m water level and 12 m wide (with 1 point per vertical)
- 0.6 m water level and 24 m wide (with 2 points per vertical)
- 1.0 m water level and 40 m wide (with 3 points per vertical) as shown in Figure 3
- 2.0 m water level and 80 m wide (with 3 points per vertical)
- 4.0 m water level and 160 m wide (with 3 points per vertical)

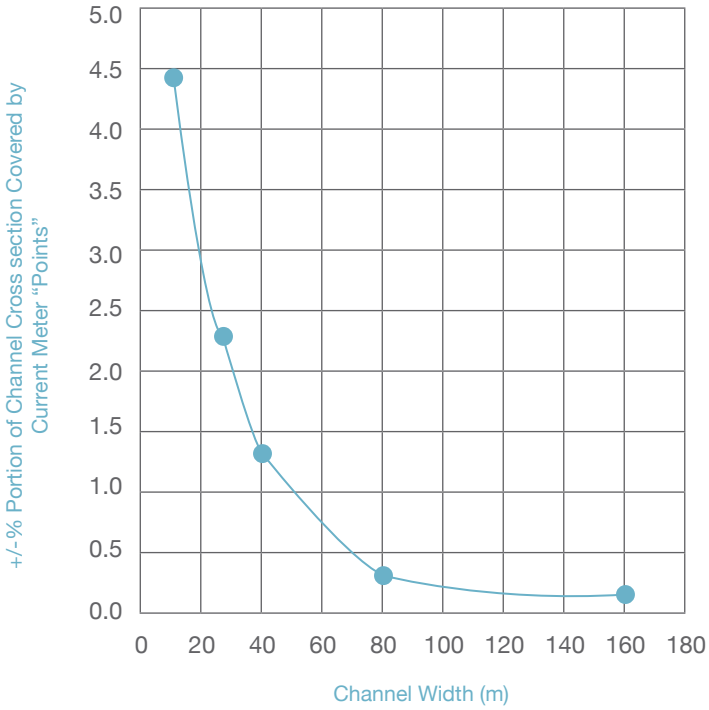
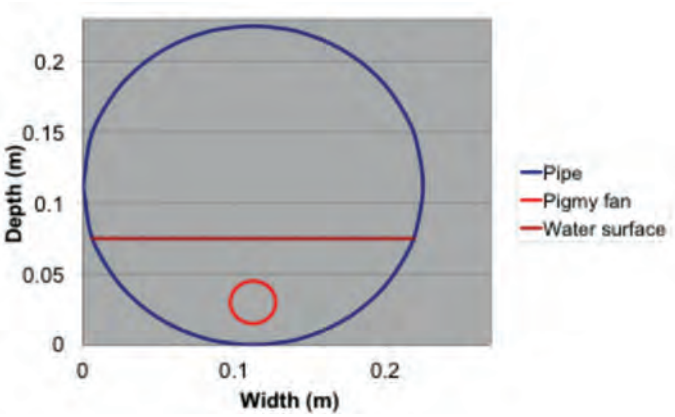


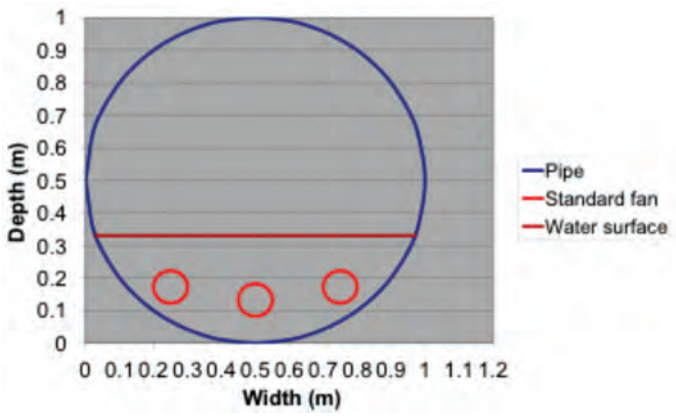
Figure 4 Implied % coverage of river Xn by current meters (Xn with depth vs width = 1:40)

So, from what is a relatively small portion of Xn coverage (e.g. 1.2% for a 40 m wide channel), the average velocity can be calculated with a measurement uncertainty of ±5%.

Now let's have a look at what happens in small pipes, using only 1 or 3 verticals. Figure 5 shows the typical proportion of the wetted cross section covered by a current meter gauging, in a 225 mm and a 1000 mm pipe, using a pigmy fan (30 mm diameter) and a standard fan (100 mm diameter), respectively, at 0.6D.



Pygmy fan in 225 mm pipe - centreline gauging



Standard fan in 1000 mm pipe - 3 verticals

Figure 5 Typical sewer pipe gauging arrangements with pigmy and standard fans

Obviously the portion of the wetted area covered by the current meter(s) will vary with depth of flow as well as pipe diameter (and current meter type and number of verticals). To let us look more easily at comparing river to sewer pipe gauging "portion covered", fix the depth at 1/3rd pipe full, which equates roughly to peak dry weather flow (PDWF). Calculating the portion covered by current meter(s), and changing from pygmy to standard fan and from 1 vertical to 3 verticals defines the relationship plotted in Figure 6.

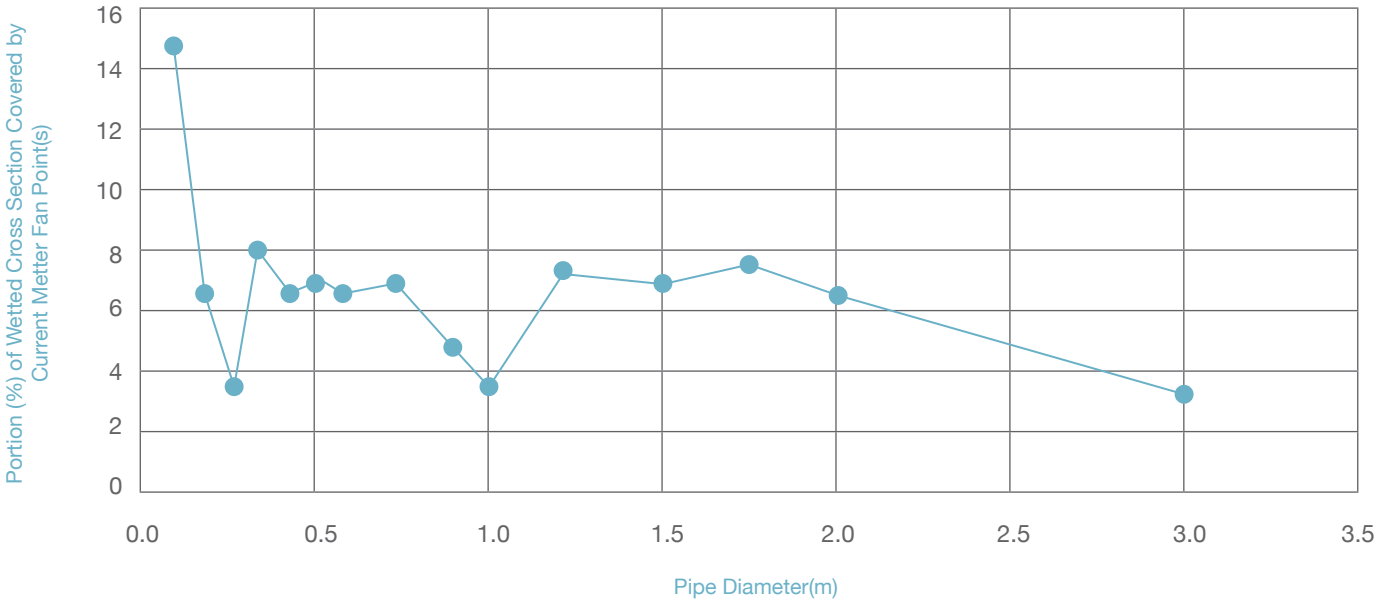


Figure 6 Typical % coverage of wetted pipe cross section (by current meter fan(s) at PDWF)

Note that the "jumping around" pattern in the above figure is accounting for changing from one point to 2 then 3 points per vertical as depths rise, then adding left and right verticals then changing from the pygmy to the standard fan, as diameters (and hence depths) increase further.

Comparing these pipe results in Figure 6 with the typical 20 vertical river channel results in Figure 4, shows that the portion covered by the 1 and 3 vertical pipe gaugings gives a similar (usually higher) portion of covered wetted area, than for 20 verticals in a river cross section. Given that the velocity pattern in a pipe is more predictable than in a river, the measurement uncertainty of these typical sewer pipe gaugings is probably more like ±5% or lower, rather than being higher than ±50% indicated by blindly applying Table E.6 from AS3778.

Some "going forward" considerations:

- Any update of AS3778 Part 3.1 should include a subsection on this aspect, as a complement to Table E.6, but to suit sewer pipe gauging
- The exposure time issue due to sewer debris fouling of the meter: encourage industry to develop mini-adcp (hand-held) to suit sewer gauging
- Try entirely different methods like dye or salt gauging

Australian Government
Bureau of Meteorology

Water Information
DATA › INFORMATION › INSIGHT

The Bureau of Meteorology Improving Water Information

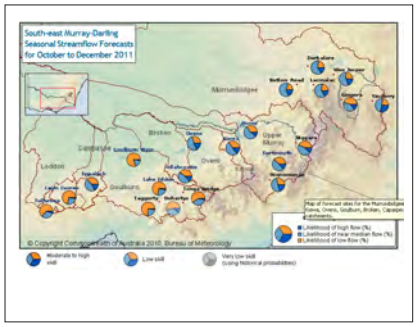
The Commonwealth *Water Act 2007* gives the Bureau of Meteorology responsibility for compiling and delivering water information. This responsibility is carried out through the Improving Water Information Program, a $450 million Australian Government investment.

A comprehensive, reliable and up-to-date picture of Australia's water resources is emerging through this Program. The Bureau is making Australia's water information freely and publicly accessible, and packaging it in a way that encourages its use. Our products and publications assist water managers, planners and policy makers. They also help satisfy the water information needs of businesses, farmers, industry, educators and the general community.

National Water Account

The National Water Account 2010 contains a set of water accounting reports for eight nationally significant water management regions: Adelaide, Canberra, Melbourne, Murray–Darling Basin, Ord, Perth, South East Queensland and Sydney.

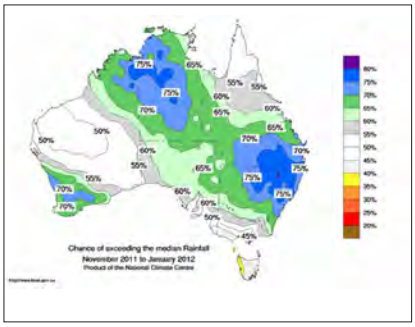
www.bom.gov.au/water/nwa/2010



Seasonal Streamflow Forecasts

Seasonal Streamflow Forecasts help to improve water management and decision-making for many water managers and users. Forecasts are published each month for the three months ahead.

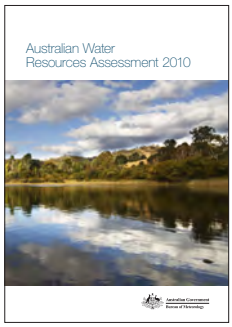
www.bom.gov.au/water/ssf



Seasonal Rainfall Outlooks

Seasonal rainfall outlooks are general statements about the probability of wetter or drier than average conditions over the forthcoming three-month period.

www.bom.gov.au/climate/ahead



Australian Water Resources Assessment

The Bureau's Australian Water Resources Assessments report on the availability, quality and use of our nation's water resources.

www.bom.gov.au/water/awra/2010

To access products and publications, or to subscribe to enGauge, our e-newsletter, visit www.bom.gov.au/water

OTT RLS

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Quantitative Hydrology

Boating Qualification Changes

Frank Davies
Department of Water, Perth, WA

The regulations under which we operate boats for water measurement purposes are in the process of significant change. In general terms we use boats for commercial purposes and this requires some form of qualification that is presently regulated uniquely, and with many variations, in each state.

In Western Australia we are required to hold a coxswain restricted qualification. This is the minimum qualification that is available. Once attained it allows us to skipper vessels well in excess of the length we normally require and travel several nautical miles out into the ocean; locations which are somewhat strangely entitled 'smooth waters'. There are no exceptions to the legislation even though much of our work occurs well away from 'navigable' waters and the hazards we encounter in swift water conditions are far different to the assessment requirements when obtaining a coxswain restricted. I would assume that each state has similar requirements.

The change that is occurring is a consolidation of the competencies into a national standard under the control of the National Marine Safety Committee. They have recently completed a road show explaining the changes and were seeking submissions from interested parties (http://www.nmsc.gov.au/index.php?MID=73&CID=70). It is too late for this now as submissions closed on March 16, but you should be aware of what is intended.

The qualification relevant to hydrography in the revised competencies is the Limited Coxswain. There are several differences to attain this compared to WA's coxswain restricted, the most stringent being 200 hours of sea service. That's a lot of gaugings! For those with the current qualification the upgrade to the Limited Coxswain appears relatively straight forward. However, for anyone new to the game it will be very difficult unless the new requirements are moderated.

In the meantime I would advise anyone who has not done so to contact their state authority to find out what the changes mean for you.

Gauging The Peel Region

Laura Parmenter and Judith Le Gresley
Department of Water, Western Australia

December, a summer month, typically characterised with fine and dry weather. Rain at this time of year is very unusual. However, December 2011 provided two major rain events that affected large parts of southern Western Australia.

Both events were caused by deep mid-level troughs lying off the west coast of WA which triggered widespread and long-lived thunderstorm activity through large parts of the Southwest Land Division and adjacent districts. The two rainfall events, on the 6th and 12th December, primarily affected a region extending from southern parts of the Lower West (including Perth) into the western half of the Great Southern region. They caused significantly greater stream flows for this time of year.

The Peel region has gauging station sites on the Williams and Hotham Rivers that reflected these high stream flows. The Shire of Williams was lashed with a record rainfall of 125.6mm, the town's wettest December day on record, and the second wettest of all time.

One farm in the region received 238 millimetres and falls of around 150 millimetres were quite common. Nearby towns of Wagin, Wandering and Narrogin were also bombarded with massive thunderstorms which produced 80 to 90 millimetre deluges.

Flooded: Williams main street, the Brooking Street bridge and walkway under water.
Picture: Sheree Watt, Source: PerthNow.

Keeping a watchful eye on the telemetry data for two sites in that catchment (Saddleback and Marradong) we realised that the team was going to get a big serve of gauging action. Scrabbling for battle with itchy feet we managed to ensure all equipment was in A1 gauging condition.
Boat – check!
Loads of batteries – check!
PPE – check!
Ropes – check!
Toughbook – check!
Don't forget the Rio!!

The regional team split into two, with the all male, supposed 'A' team to gauge the Marradong (Hotham River) by boat. This left the region's two measurement ladies Judith and Laura (no captain needed as we both kicked ass) to gauge the Saddleback station on the Williams River using the travellerway.

Team A used the Rio and in no time successfully gauged the Hotham River with a total discharge of 94.8 m3/s.

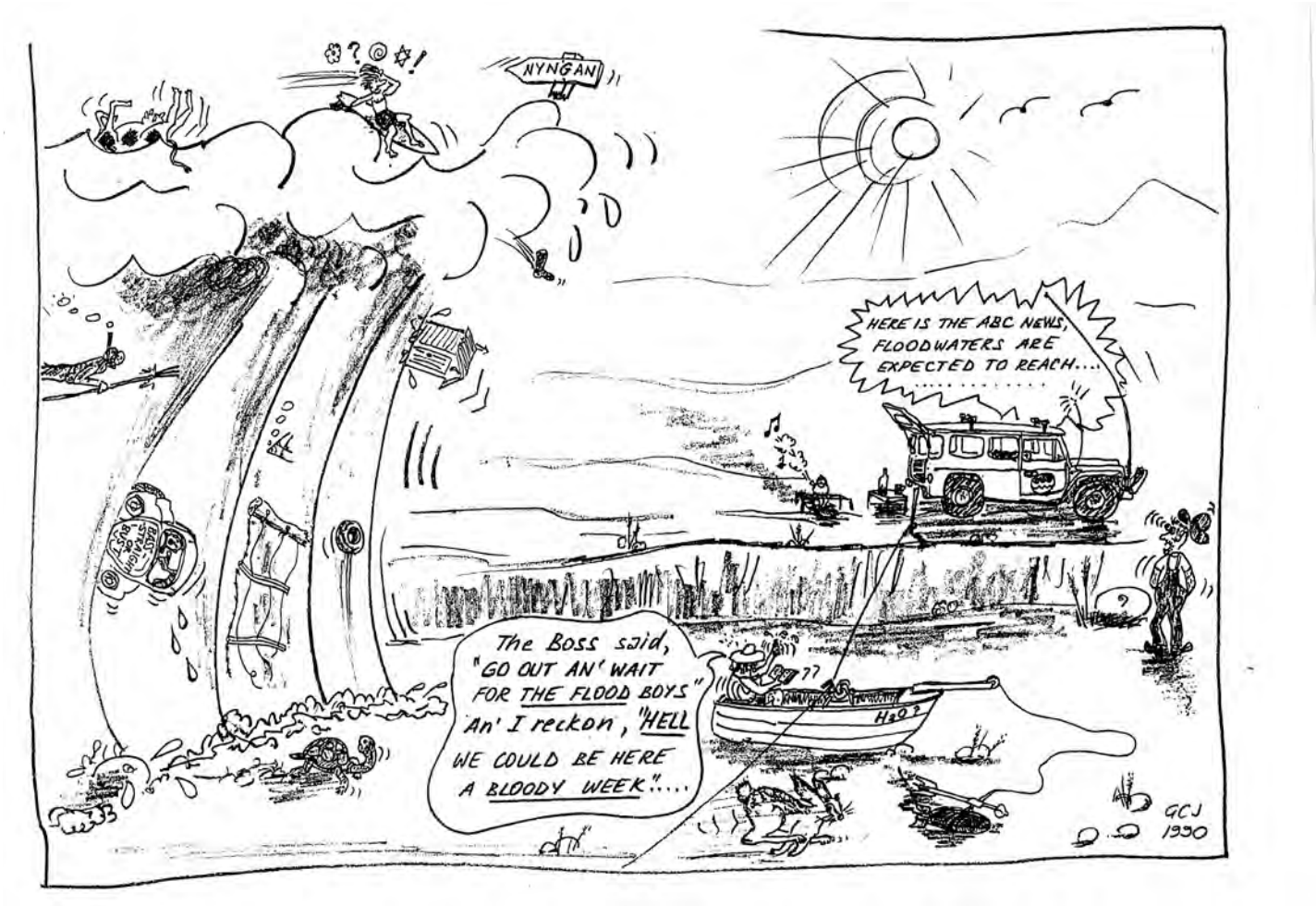
Hotham - Marradong Bridge.

Williams - Saddleback.

While the boys were merrily gauging, the gauging girls weren't so lucky. The travellerway was persistently refusing to traverse smoothly and, quite frankly, not at all. (Note to self – maintenance required on travellerway). There was also a second tiny issue, with WinRiver II failing to operate on the Toughbook. Needless to say, we couldn't use the Streampro. As we sat there helplessly watching the river level fade away, with tears rolling down and words unthinkable being mentioned, we swallowed what was left of our pride and phoned team A to use their equipment. The boys were looking very smug as if they had saved the day. Saddleback was eventually gauged with a total discharge of 60.4 m3/s.

But the action didn't stop there. The following day Saddleback still required gauging on the recession. The task of the day was handed over to the gauging girls, after some questioning of their confidence of boat handling in these conditions. (Now remember, we are only exposed to limited opportunities with boat handling due to our rivers and streams not having a large and frequent flow rates). The gauging girls redeemed themselves with a successful recession gauging with a total discharge of 43.6 m3/s.

Needless to say these two days of gauging have been invaluable to our team, enhancing our skills, knowledge and fostering a good team relationship. The main upside is that the information obtained in these two days will enable us to improve the quality of the site's ratings.



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

Inmarsat / Hughes IP modem trial

Neil Chapman
Department of Water, Western Australia

Background

For the past few years BoM (Bureau of Meteorology) have been encouraging Western Australia's Department of Water (DoW) to add back-up telemetry into existing flood warning sites. Recent flood events on the east coast will no doubt resurrect this issue. BoM have already installed their own Alert system alongside a few of our existing sites. To enable this, the DoW's Hydrologic Technology Centre (HTC) supplied special instruments with 4/20 mA output compatible with the Alert system. There are many issues associated with the Alert system that do not fit well with DoW directions and hence the need to find alternate solutions. BoM's biggest concern with DoW's existing telemetry is that the communications carrier will fail in times of heavy use such as during floods or fires. This is a fair concern with the 3G network especially prone. Satellite systems have fewer users and are not as prone but can still potentially fail for a host of reasons. No system is 100% guaranteed. As there is little point in installing a second backup system using the same carrier as the primary, and 3G systems are not preferred, investigations are focused on alternate satellite systems. Fortunately a new satellite IP system has just become available. This satellite is a newer Inmarsat geostationary one located over PNG (the older dialup Inmarsat satellite is located over Fiji and has an elevation of 15 degrees) and for most of WA can be accessed provided there is a clear view at 40 degrees elevation to the north east. A big advantage with this new system is that similar to existing 3G systems there is continual access with no delays waiting for a satellite to come into view.

The Trial

The new Hughes modem and Unidata Neon terminal were pre-configured by Unidata and delivered to DoW. Initial tests in December at the HTC investigated its ease of use and compatibility with existing instruments. The HTC test area is clear to the NE and is in a heavy industrial area. Signal strength was around 50 (60 is good, 40 is marginal) which was lower than most remote areas. It is thought that nearby power lines may have caused some signal loss. The system was connected to a DoW standard SDI-12 pressure instrument with a solar powered 12V battery and data was transmitted to the existing DoW Neon server. Power consumption was low and within DoW requirements.

Test rig with Hughes modem, Neon terminal and SDI-12 level instrument.

No faults were observed during this period with all data being successfully transmitted. The trial was then moved further afield and the system tested alongside existing LEO satellite sites (Walyunga and Yalliawirra) located in the Avon valley just north of Perth. The system performed very well at both locations and was able to connect to the satellite even from the base of a steep river valley as low as water's edge. The river valley lies in a north/south direction with the antenna dish facing towards the valley hill crest. Signal strength 55-57.

Previous experiences with the dialup Inmarsat system using the Thrane and Thrane modems proved to be unreliable from sites located along the south coast of the State. This locality was therefore chosen to further test the Hughes modem. The map shows the location of each test site. Test sites were chosen where either steep slopes or heavy scrub would most likely cause system failure.

Location of test sites in the SW of Western Australia.

Approximate test area on the south coast.

Site 1 Stirling Ranges.
In valley floor with medium density forest to NE and peak 600m.

System failed to connect.
Signal strength 30-40.

Site 2 Stirling Ranges.
Half way up valley slope, clear exposure to NE and peak 500m.

System connected immediately.
Good signal strength 56.

Site 3 South side of Porongurups.
Some trees in path to NE with peak at 400m.

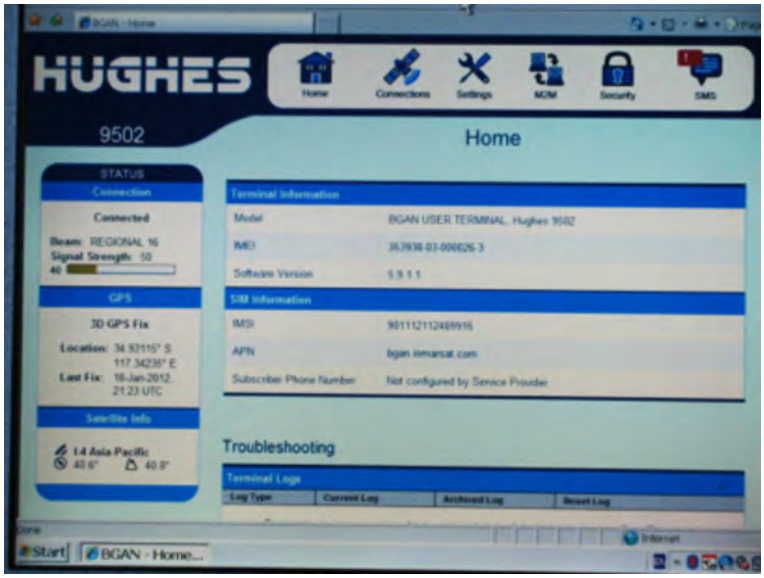
System connected immediately.
Signal strength 56.

Site 4 Denmark, Scotsdale River Valley with heavy scrub, hills to NE 150m.
System failed to connect when close to scrub.
Scrub height around 5m.
Signal strength 43.

However, after relocating 5m SW from scrub, the system connected immediately.
Signal strength 50

Site 5 Nornalup Forest Tall Trees (40m) withLow Understory.
System connected immediately with signal strength "Narrow" and 51 and also "Region 16" and 65. Not sure why the changeover in signal strengths.

Site 6 Shannon Forest Medium Trees with Heavy Understory to 6m.
System failed to connect.

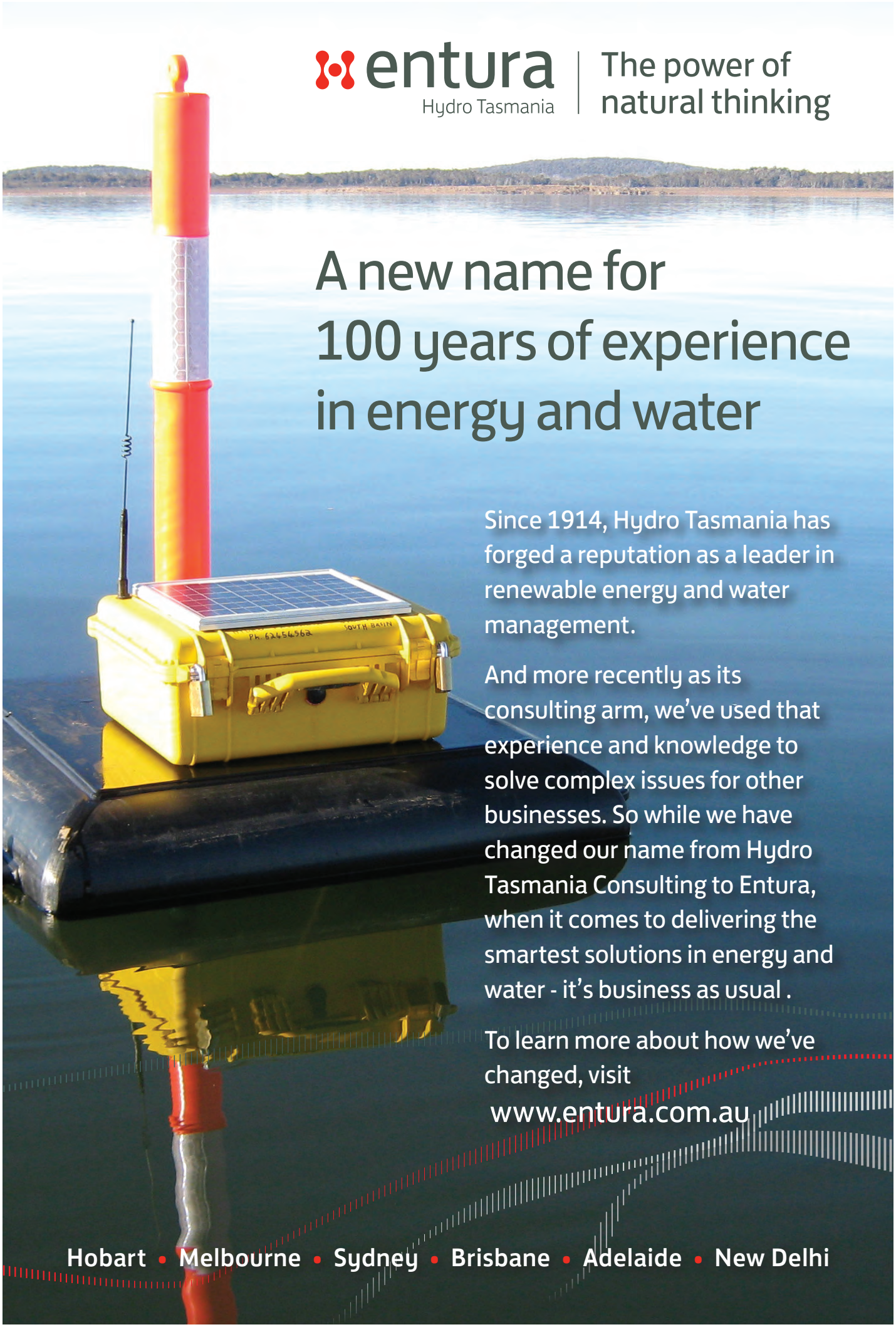


Hughes software appearance showing signal strength.

Trial Outcomes

- Overall the Hughes modem with Neon terminal performed surprisingly well and it was hard to get the system to fail.
- Provided there is a clear view from the antenna dish to the satellite, connection appears to be guaranteed.
- The antenna dish includes a 15 m low-loss coaxial cable and is a directional type. Unfortunately the antenna dish is highly visible and therefore may not be suitable in vandal-prone sites.
- Topography in the SW of Western Australia is typically low with the peaks in the Stirling Ranges (some of the steepest in WA) located at around 20 degrees elevation from base. Therefore the 40 degree elevation and NE bearing to the GEO satellite will most likely allow clear view from many WA hydrometric sites.
- Thick scrub appears to stop all transmissions and this is to be expected with any radio system.
- Medium tree canopy appears to be OK.
- Indicative costs are about the same as the Globalstar system.

HTC is liaising with Unidata on suitable housings that will maintain compatibility with existing systems and has ordered two systems to conduct long term trials.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NEW FROM HYDROLOGICAL SERVICES

"MagnaRod" (*Electronic Top Set Wading Rod*)

The new MagnaRod incorporates all of the features of our traditional Top Set Wading Rods with full integration with our PVD100 and CMCSp current meter counters.

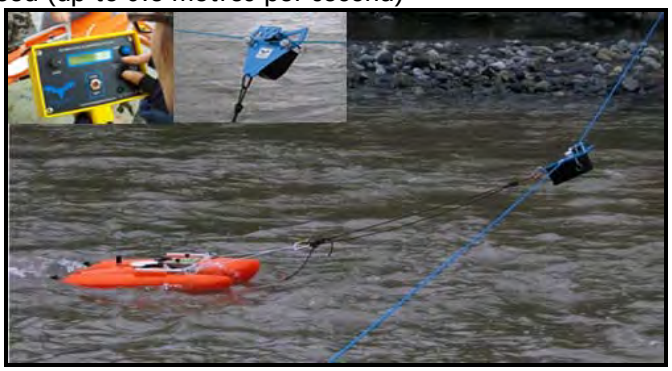
Using magnetic technology, soundings and current meter depths of observation can be accurately and easily measured and displayed on the in-built LCD. Sounding can be measured (and displayed) by a simple push of a button with the current meter simply adjusted up or down until the LCD display indicates the required depth of observation (e.g. 0.2d, 0.6d, 0.8d) with depth of observation reading displayed as a percentage and absolute reading. Velocity measurement is also instigated with a simple push of the button with point velocity displayed with current meter fan counts. Measurements can be transmitted via Bluetooth to a compatible PDA or field computer in order to estimate total discharge.

Compatible with most mechanical type current meters & SonTek FlowTracker ADCP's.

"Flying Fox" (*A.D.C.P. Positioning System*)

The Flying Fox system is a unique, portable and powerful remote controlled A.D.C.P. positioning system without the need for erection of a wire cable for medium to high flow stream discharge measurements. The device can be operated 'wirelessly' and 'safely' from the bank using a hand control with the Flying Fox attached a to a nylon rope erected across the stream. Main features are;

- Easy set up and dismantle
- LCD displaying distance (feet or metres), traversing speed, battery voltages, current draw & radio signal strength
- Simple 'rotate and press' controls
- Low power consumption with LED's to indicate system status
- Variable traversing speed (up to 0.5 metres per second)



For more information on these or other products please contact Mike Lysaght.

(T: 02 9601 2022 Email: mikel@hydrologicalservices.com)

New Life For An Old Gauge Board

Alex Springall

Back in 1917 the gauging station on the Lachlan River at Cowra (412002) was moved to the main road bridge. Before the new bridge was built in 1986, a colleague, Paul Corbett, salvaged an original cedar gauge board. He'd kept it until now, when he asked me to make something from it.

Old Lachlan River Bridge at Cowra.

Considering it had been in and out of the water every day for nearly 70 years, had been shot at, hit by logs and debris and lain in a workshop for years, where it had mineral oil spilled on it, it wasn't in bad condition.

The first step was to clean it as much as possible. First, I scrubbed it with hot water containing detergent to remove surface dirt and grease. Then I scrubbed it several times with white spirits, making sure that it was soaked. After the last scrub, I packed it in Kitty Litter (Fullers earth) and wrapped it in plastic for a couple of days, after which it was left to air dry.

The design process was difficult. He'd given me free reign, and in view of our work a weather station seemed appropriate, but I didn't want to mount instruments in the board. I also wanted to let the board show as much of its history as possible, and I wanted something that connected it to the river.

I settled on mounting it on an Australian white beech base, with its surface carved to represent the flow of water. I dressed and sanded the base and gave it a coat of white shellac before drawing the pattern and carving it. This was my first attempt at carving, and I found the timber easy to carve with my cheap carving set.

Once it was carved and the mortise cut for the board to sit in, the surface didn't show the strong visual contrast that I wanted, so I decided to stain it using water based dyes; again, something I'd never done before. I put a coat of wax on the top surface that I didn't want stained, mixed up a brew that looked the right colour and carefully brushed on the dye. Disaster! When the stain dried, the brown that I had brushed on was hot pink! OK, what does the Polisher's Handbook say about this? Do a test piece! In hindsight, that seemed a good idea. I added what seemed like a gallon of green-black and diluted it, and did a test piece. When I put it on, it looked a kind of murky green, but eventually it dried to the brown that I wanted, so I went with it. After it was completely dry I gave it a very light sand, then a coat of shellac followed by another light sand. This laid the foundation for four coats of wipe-on polyurethane and a coat of wax.

The next question was what to do with the gauge board. Short of completely removing all the character of the board, it was never going to take a nice gloss finish. In the end, I gave it a couple of good coats of shellac to toughen it, which had the effect of also livening up the previously dull grey surface. The final part of the finish was to give it several coats of wax to bring up a slight sheen.

The cedar board that the instruments are mounted on was dressed, sanded and finished with wipe-on polyurethane. The dowels that support the instrument board were turned from silver ash, with markings to represent the current meter rods. The final assembly was glued using tinted epoxy.

After it was completed, I discovered a copper medallion produced by the department we'd worked for, with its logo, the ibis. This was inlayed on the front of the base.

I hope Paul is as happy as I am with the result.

Alex Springall
http://web.mac.com/alexspringall

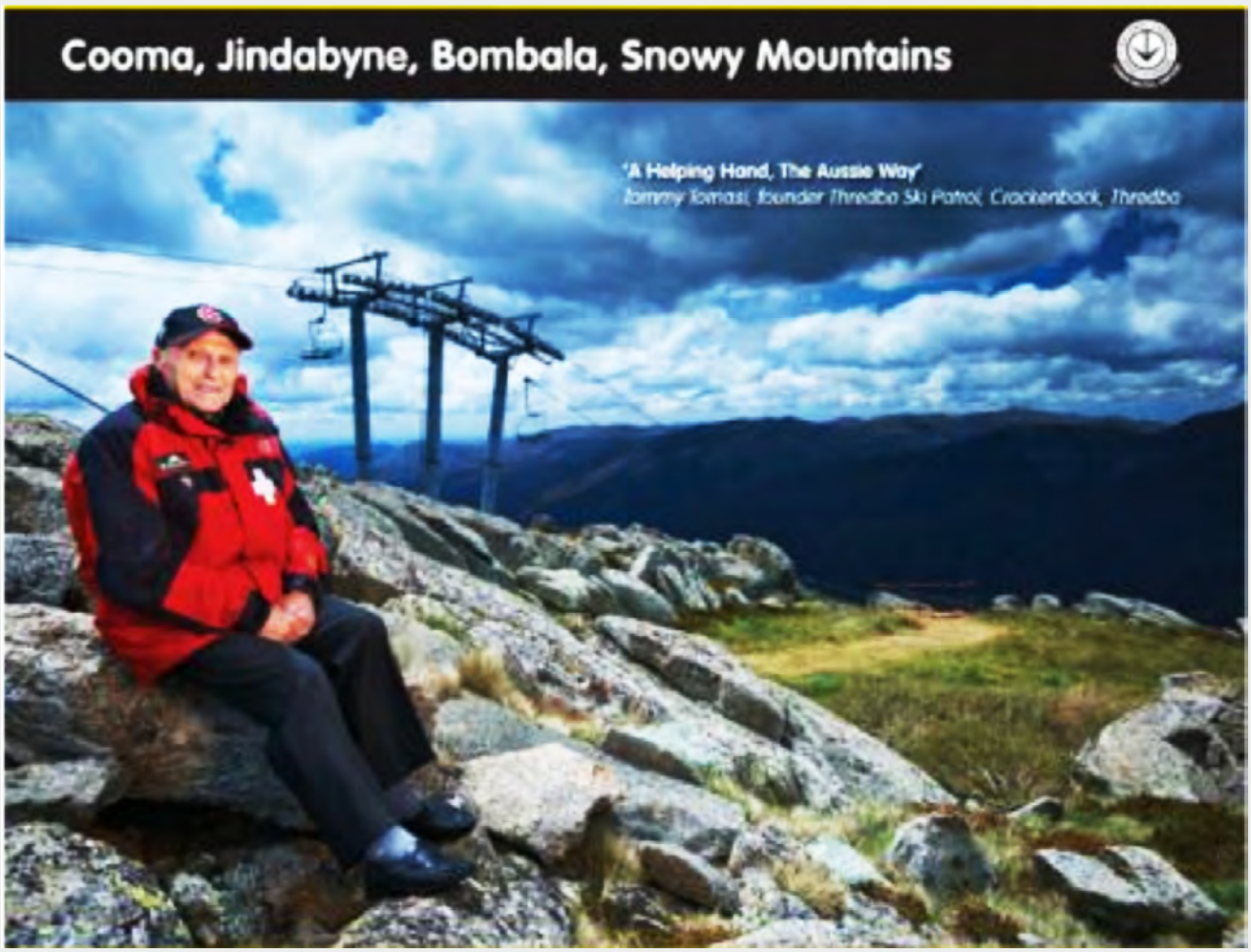
After delivery Paul sent through this picture of the finished product.

Paul Corbett with Alex's creation.

More Recognition For Ex Snowy's Hydrographer

In the May 2009 AHA journal (http://www.aha.net.au/resources/journal/ah2009/#05) Mic Clayton recalled the work in the early days on the Snowy Mountains by Tommy Tomasi. Tommy worked as a field hydrologist in the Snowy Mountains Authority before following his passion for skiing in the same area.

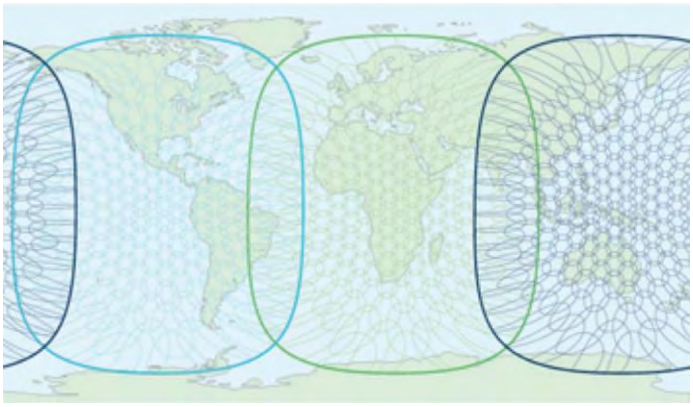
Telstra have also recently picked up on Tommy's story by featuring him on the cover of the Cooma Yellow Pages, although the emphasis is on the snow rather than hydrography.



Inmarsat - BGAN M2M

A new and cost effective option for Satellite Telemetry

Unidata has always led the market with it's Neon Remote Terminal Satellite, offering different telemetry options. Over the last few months the satellite telemetry options available have increased and the existing services have got better, so there are more choices, and higher levels of service available.



In February, Unidata released it's new NRT (Neon Remote Terminal) Satellite - Inmarsat M2M (with the new Hughes 9502 Modem) along with an update to the Neon Applications Software to support for the new satellite service.

Inmarsat, the owner of the large Inmarsat Geostationary Orbit (GEO) system released some new products, the Inmarsat ISAT Data Pro, store and forward message system, and the Inmarsat BGAN (Broadband Global Area Network) M2M system, both of which provide additional telemetry options and enable a higher level of service for always on applications.

Inmarsat is a large publicly listed company based in the UK. In 2010 Inmarsat won the MacRobert Award for its BGAN service. Inmarsat's latest I4 satellite system (as used for Inmarsat BGAN) uses geostationary satellites to provide near global coverage. Each Inmarsat I-4 Satellite is about the same size as a double decker bus and can generate 19 wide beams and more than 200 narrow spot which can be quickly be reconfigured and focused anywhere on Earth to provide extra capacity where needed.

The Inmarsat BGAN M2M (Machine to Machine) service addresses several needs of the remote telemetry business and will be a serious entrant to this market. The Inmarsat BGAN service has always been a high quality high availability service but previously was considered too expensive for telemetry applications and the BGAN terminals, while high quality were always needing higher power input that was acceptable for telemetry applications.

The new Hughes Inmarsat BGAN M2M terminal addresses these market issues as it is smaller, lower cost and has low power consumption, all important issues in the data logging and telemetry market. These objectives are met, but the higher level of service has been maintained, and there are appropriate tariff options offered by Inmarsat to better meet the needs of customers wanting to have effective satellite telemetry

Unidata worked with Inmarsat in London and with Hughes Network Systems in the USA, to do Beta tests on the initial units from Hughes. These tests confirmed that this new Inmarsat BGAN M2M service well suits the needs of customers in the environmental monitoring and industrial measurement business. Service availability is very high and power consumption is low and the tariffs are reasonable, around $30 to $40 per month. The new modems and the new service enables different and new applications now, and into the future. As the service is connected via a GEO system, it is always on, rather than needing to wait for satellite passes.

This always on service is similar to an ADSL or cable internet connection in your house and opens new applications possibilities. Data can be sent immediately, without waiting for satellite passes. Now this new service is available, Unidata has improved the camera offerings, with an always on / high definition camera option which can capture high definition images and some moving picture segments if required on demand.

Unidata remains committed to supporting the Globalstar Low Earth Orbit (LEO) system which remains a good, cost effective and improving service. Globalstar have recently added extra satellite capacity and the service availability has improved substantially, which is pleasing many Unidata customers. With Globalstar reliable data transmissions will occur every 10 minutes, or better, and this remains a very practical communications interval for data logging / telemetry applications.

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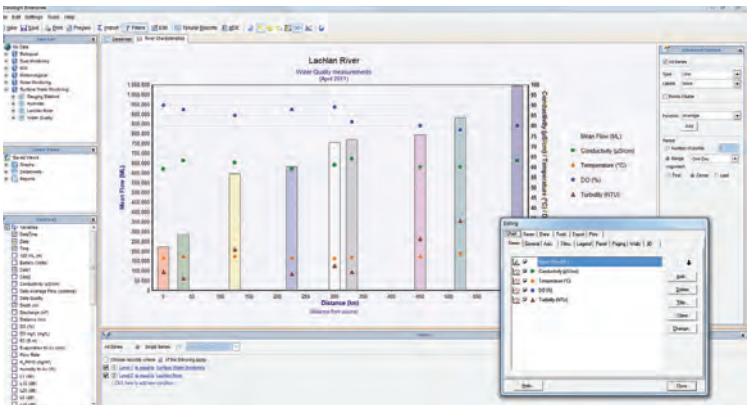

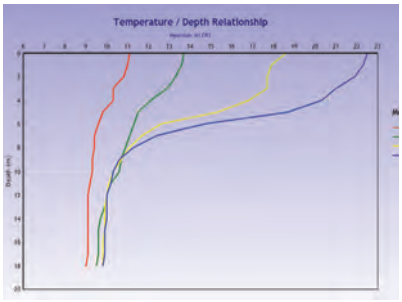

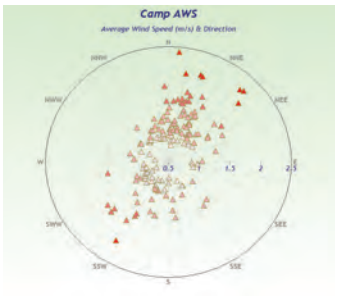

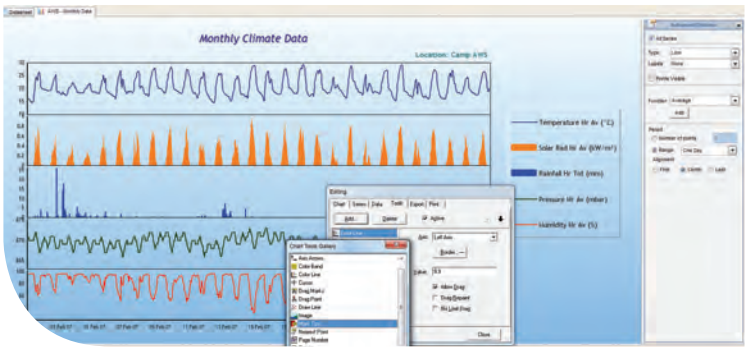

DataSight amalgamates time series hydrographic data with water quality and biological data sets. It is used across 14 countries by government authorities, mining companies, shipping ports and environmental consultancies to manage their entire water resource and environmental data sets.

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