AUSTRALIAN HYDROGRAPHERS ASSOCIATION

Australasian Hydrographer

We Don’t just do water flow!
Photo supplied by Matt Scaddan, Enviroequip

May, 2007

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THIS ISSUE

EDITORIAL

Some may think that a hiatus has settled over water and its many issues. In some places it seems that nothing is being done about water while possible 'changes in the air' and the implications of the possible changes are still floating around.

The National Water Plan (or at least the $10 billion part of it) seems stalled while the Victorian and Federal governments nut out some finer points of the plan. OK, so lets hold off on doing anything to do with water until we see what eventuates.

It has started raining again in some places (lots in some areas!) OK lets hold off on doing anything about water now its rained and , by the way, its an election year lets hold off on doing anything about water until after the election.

Meanwhile important water information may not be recorded or even poorly recorded (which is probably a worse scenario) as some agencies go into a wait and see mode on 'possible', yet to materialise, water decisions.

This is the time where those involved with water information need to look ahead and plan for the 'possible' new way of water information sharing.

Water is a public wealth and regardless of how the politics are going, it is in the interests of the nation and its people that water information continue to be measured well and consistently so that this information can be reliably used for management of our water resources.

That is why there are members of your Association working together with a vision for the future of good water measurement and hence management of water , regardless of the inactivity of some states and agencies.

Being at the wet end of water issues means that we know that water data is just more than just sticking a sensor in the water (or in no water in some droughtier places) and then walking away. We know that catchments and their processes are dynamic and influenced by a wide variety of factors. Our knowledge and understanding of these processes enable us to turn water data into good water information used in the decision making process.

So it is important that we, as professional hydrographers and field hydrologists, be involved in developing appropriate standards and knowledge bases to ensure good water measurement and management in Australia, for the good of Australia.

Mic Clayton - Editor

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Visit our **Web Site** at: **http://www.aha.net.au** to download a Membership application and to find contact details for your state representative.

Editorial and advertising enquiries should be directed to the Association's **Publicity Officer**, Mic Clayton.

Journal editions are generally produced February, May, August and November. Copy is requested to be with the Publicity Officer by the previous month.

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PO Box 843, COOMA, NSW, 2630.

Australian Hydrographers Association Inc

C/- The Secretary, 52 County Drive, Oakford, Western Australia

Preliminary Notification

INITIAL ANNOUNCEMENT AND NOTIFICATION TO FINANCIAL MEMBERS AND VISITORS

THE 27TH ANNUAL GENERAL MEETING OF THE AUSTRALIAN HYDROGRAPHERS' ASSOCIATION,
Crowne Plaza Hotel,
1 Binara Street
CANBERRA.

WEDNESDAY AUGUST 15th , 2007. 4:45 PM TO 6:00 PM (promptly)

Preliminary Agenda (Not Finalised)

1. Attendees (requested to fill in attendance sheet on entry to AGM)
2. Apologies
3. Minutes of 2006 AGM
4. Committee Reports:
   - Chairperson
   - Secretary
   - Treasurer
   - Publicity Officer
   - State Representatives (tabled only)
5. Announcement of resignation of Scott Walker as Committee Member as of this Annual General Meeting requiring ballot for this position.
6. Appointment of Committee Election Monitor.
7. 1 Committee positions declared vacant at this AGM and election of the following positions for the one year balance of the triennial term to be conducted:
   - One Committee Member
8. General Business (To be finalised)

Note:

AHA members may wishing to have an item tabled in General Business at this AGM, are required to lodge the item with the Secretary of the AHA no later than COB Friday, August 10th 2007. Items may be emailed to secretary@aha.net.au or by post to The Secretary AHA, 52 Country Drive, Oakford, WA, 6121

Nominations and proxy voting forms for Committee Vacancy (One Committee member) are to be received by the Secretary of the AHA by COB, Fiday August 10th, 2007. Nominations/Proxies may be emailed to secretary@aha.net.au or by post to The Secretary AHA, 52 Country Drive, Oakford, WA, 6121.

Preliminary Agenda Issued by the Publicity Officer of the Australian Hydrographers' Association On behalf of the Australian Hydrographers Association Committee, 9th July 2007.

Flood Gauging at recently Re-established Gauging Stations in the Lake Eyre Basin, Far Western Central Queensland

This paper was presented by Paul at the recent 13th AHA Conference and his attendance at the conference was supported by the AHA through an Educational Travel Assistance Grant after Paul submitted the proposed paper to the AHA committee for consideration. This is the second part of his paper, which details the trials and tribulations that many remote area hydrographic teams endure chasing important water resource information. More information about the Travel assistance Grant and the Educational Assistance grant can be found on the AHA website at www.aha.net.au

PART 2

Survey of flood slopes

Two clear flood slopes were definable on the right bank of 001203A. These marks were surveyed down the reach for a length of approximately 350m. The results of these surveys can be seen in Figure 3.7. Using the Doppler to sound a long section along the approximate middle thread also provided interesting results, as seen in Figure 3.8, the significant changes in bed level may be responsible for the variations in surveyed water levels.

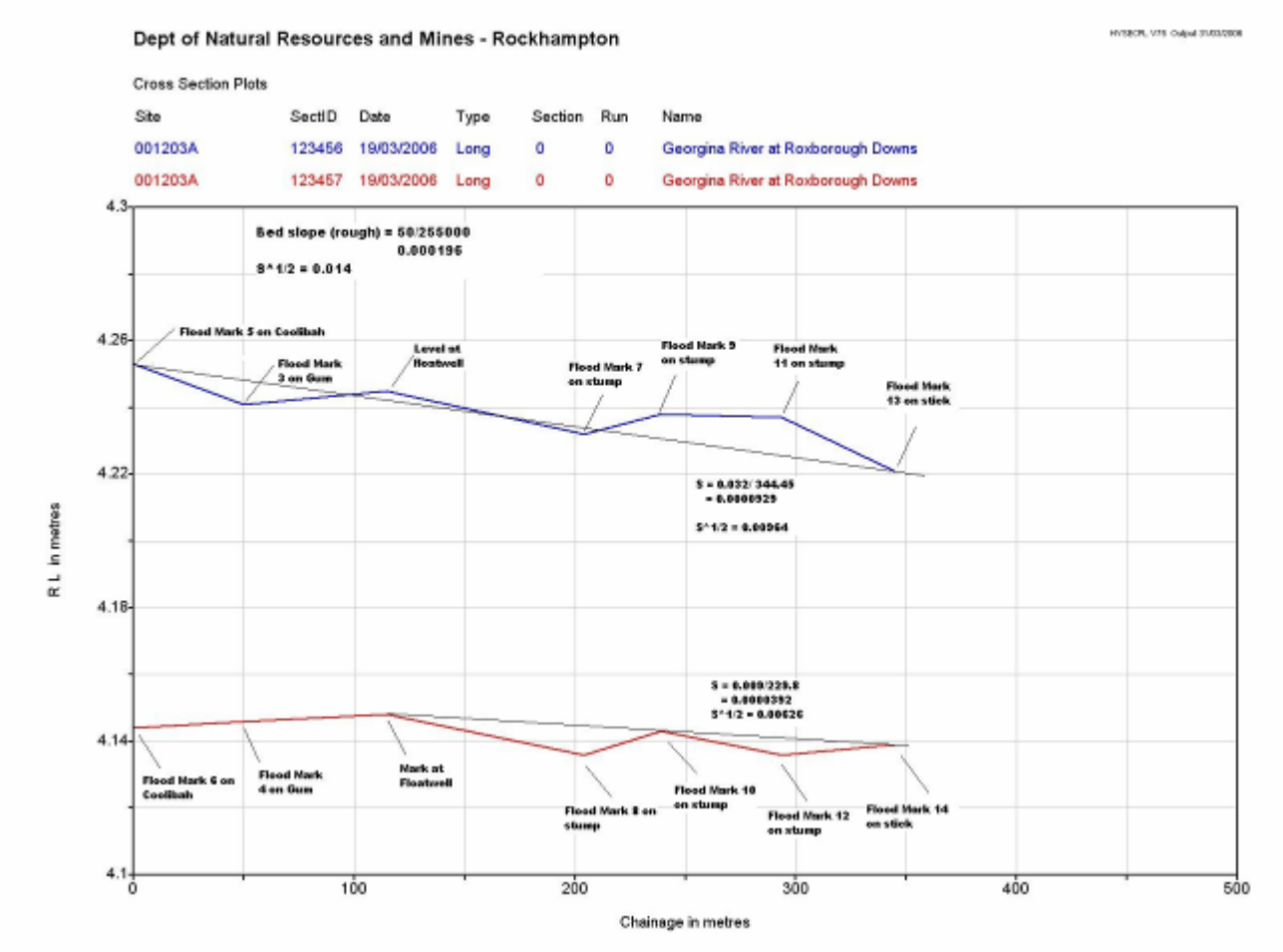
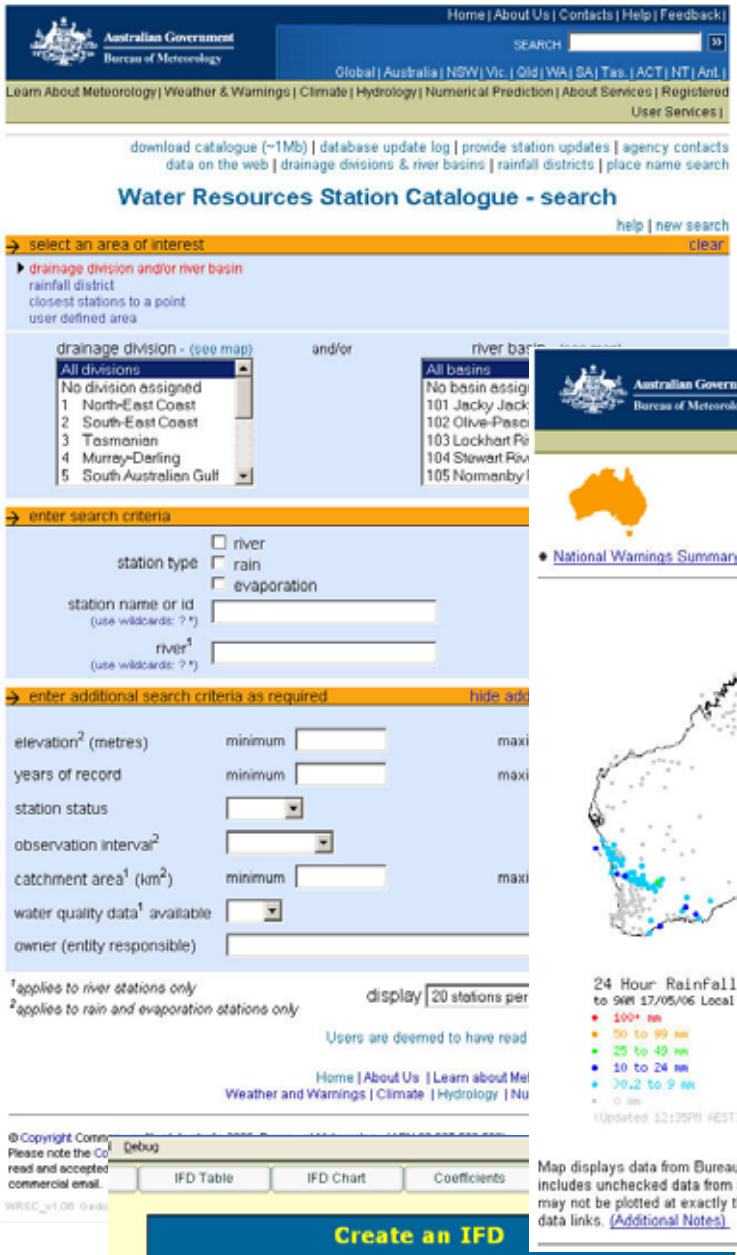


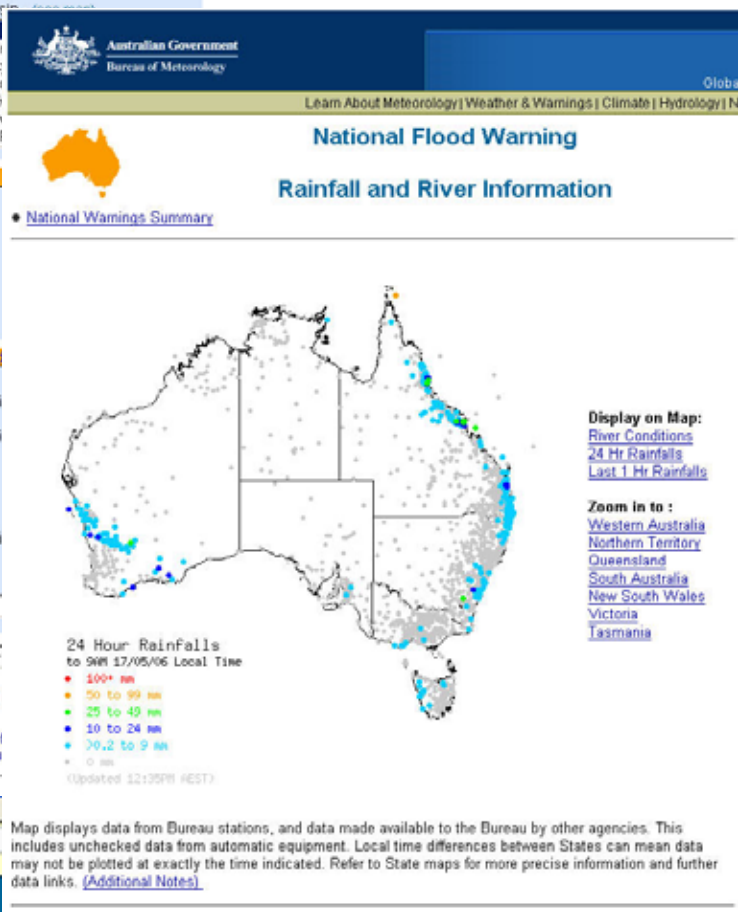
Figure 3.7 Surveyed flood slopes @ 001203A

BUREAU OF METEOROLOGY RESOURCES ON THE WEB

www.bom.gov.au/hydro/wrsc



www.bom.gov.au/hydro/flood



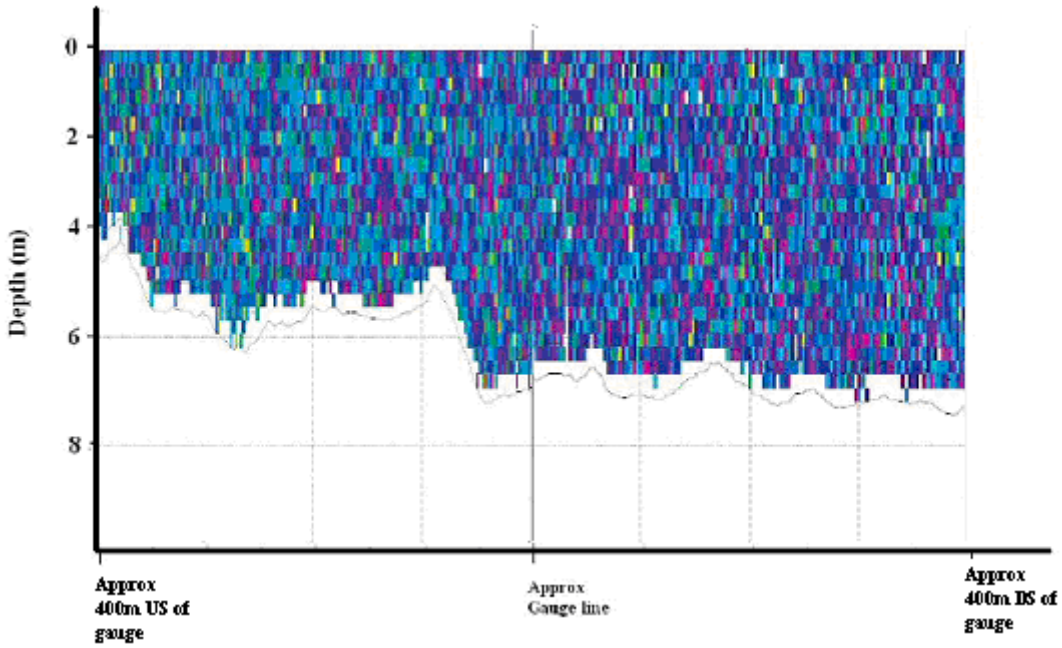


Figure 3.8 Bottom track at 001203A along approximate middle tread

Using Hydstra to analyse cross section 870001, done in 1987, a hydraulic radius of 4.86m and area of 352.786m^2 was determined for a gauge height 4.098m, the highest gauged Q. Using the three different flood slopes along with the highest measured Q of 71.228, a value for Manning's N was obtained using the relationship

$Q= ((R^{2/3}*S^{1/2})/n)\ A$

Where

- R is the Hydraulic Radius in m
- S is the slope and is without units
- n is a roughness factor
- A is the cross sectional area in m^2

This analysis results can be seen in Table 3.3 below

Table 3.3 Results of Manning's N calculation

Q	R	A	S	N	Slope Origin
71.229	4.86	352.286	0.000196	0.198666	Map 1:250000
71.229	4.86	352.286	0.0000929	0.136774	Flood mark 4.24m
71.229	4.86	352.286	0.0000392	0.088846	Flood mark 4.144m

4. Discussion

Operational Issues arising from the Trip

A number of issues became apparent during the trip which should be addressed before the next flood gauging trip to these far western sites. While some are specific to these sites other issues may have implications for all future flood gauging. Possible responses to each issue are suggested, further solutions will be generated by discussion within the work group.

Requirement for a second spare tyre

Currently Hydrographic Vehicles within Central region only carry one spare tyre. The gauging party on this trip was required to impose upon the generosity of property managers twice on this trip, which was alright but may not always be an available option. Given the distances between towns and the often degraded nature of outback roads after rain a second spare tyre seems an

essential requirement. Alternatively a tube could be carried along with the tools to fit it. Training in the use of those tools would also be required.

ADCP set up with GPS and Depth Sounder

This was the first gauging trip undertaken from the Rockhampton office with the ADCP also set up to record GPS and depth sounder data. While the extra instruments provided good additional data several issues arose from their use. Firstly, the mounts for the depth sounder appear to require modification as they do not fit the ADCP mounts properly. This is easily fixed by drilling out the current 8mm holes to 10mm but will need to be checked and corrected on both mounts. Secondly, the USB hub that connects the GPS and depth sounder does not always work correctly. To confuse matters more the fix seems to change each time the problem occurs. A new type of USB hub or new procedure to connect the devices may be required so that set up time is minimised with a high degree of repeatability in set up procedure. Lastly, large amounts of spare cable for the GPS antenna and depth sounder transducer along with the cables all ready in the boat create a certain amount of confusion, present a safety hazard and increase the risk of damage to the equipment. Selecting shorter cables, housing the cables in a conduit or replacing some cables with Bluetooth technology are possible solutions.

Delays in preparing for Flood Gauging

Delays in recognising that an event was likely to occur at 002104A delayed the gauging party roughly 3 days at the start of the event. As could be seen in figure 1.4 the majority of the rainfall fell on the 10/3/06 causing a rapid rise in stream gauge heights, the rainfall was in line with amounts suggested by the BOM 'Flood Information River Brochures-Diamantina' to cause minor flooding. Given the flood gauging priority assigned to the system future rainfall in the area may need to be monitored daily so that trip preparations can commence as soon as the rain falls.

Delays in packing the vehicle cost the gauging party approximately a further day at the start of the flood gauging trip. These delays could be minimised by numerous options, two of which are discussed. Flood gauging equipment could be separated into kits ready to go, in their own place at the depot, stock takes could be done before the wet season and after each use to insure all the required equipment is there. This would reduce the time taken in collection the equipment and checking it. Another option, which would speed the process further, would be to pack at least one truck primarily for flood gauging at the start of the wet season. This truck would contain all the required equipment such as ADCP, motor, safety equipment and camping equipment required if immediate departure for a flood gauging trip was required. This solution would require a fundamental shift in operational culture from vehicles being assigned to parties to vehicles being assigned to duties. For example, while one party's vehicle was loaded in preparedness for flood gauging, that party may require to use another vehicle for service trips during that period. The ideal response to this issue may require both setting up a vehicle for flood gauging which can respond rapidly to events and the grouping of the remaining equipment at the depot such that the other vehicles can also respond if further vehicles are needed else where.

Carrying of Sufficient Spare Equipment

Sufficient spares to fix minor recorder problems should be carried such that minor repairs can be done on recorders that are misbehave prior to or during the trip. Due to the distances involved in travelling to the sites in the LEB spending extra time in the area to fix recorder problems in the area seems an appropriate operational practice. This may enable routine servicing in the area to be postponed temporarily. The carrying of spares does however mean extra weight is required to be carried throughout the trip. The possibility of leaving excess spares at Longreach temporarily during trips may be advantageous and worth looking into.

Other operational issues

These issues also faced the gauging party require discussion within the workgroup and require discussion within the workgroup before the next gauging trip to the area

- No access notes taken
- Require a minimum 512MB Thumb drive for photo storage

- Both people unfamiliar with truck layout/ available
- Both people unaware of where rainfall had occurred
- No trip plan submitted or prepared
- Fridge, not working properly, unable to freeze samples
- Car too heavy, overloaded before the boat was picked up
- No lead to interrogate Campbell Loggers

Access to 002104A

After local rainfall access to 002104A from Boulia proves very difficult, even after 11 days dry weather. On this trip access from Boulia, via Springvale Rd, was the only route attempted. This was for two reasons.

- Equipment was required to be picked up from Boulia Shire Council Depot.
- With the Western River flowing to the south of Winton access was likely to be less viable then on the route attempted.

In the future routes from Winton, Windorah or Bedourie after similar events could be attempted to compare the access conditions along those roads. However, the RACQ conditions report (2006) for trouble spots in the region suggests, that after substantial rain, access along any of these routes is likely to be poor. As a minimum consideration for future trips, local property managers should be contacted prior to trip to assess the possibility of access.

To improve chances of gaining access there are many different strategies that could be adopted in the future. These include, targeting events with little local rainfall, taking two vehicles on gauging trips in this area and, leaving equipment at Diamantina National Park and flying in. Each possibility is discussed in more detail.

Targeting events with heavy rainfall in northern sections of the catchment and little local rainfall would mean many chances to gauge the river would be missed. However access, especially from the south is likely to be greatly improved. Small tributaries to the river, such as Spring Ck, which prevented progress on this trip, are unlikely to present a problem in this scenario. This would be especially true if preparations could be made such that the gauging party actually arrived before the flood water, which is possible given the nature of the stream. Movement once the flood water arrived or if rainfall occurred during the trip would of course restrict movement once the party arrived and could prevent the vehicle leaving for a prolonged period of time.

Two vehicle gauging trips to the Diamantina River would allow each truck to be loaded lighter and will a give greater recovery options if one vehicle is to encounter problems. The silt drift in Figure 3.3 would have mostly been passable with a second vehicle. The disadvantages of this method include the requirement for 3 people on these gauging trips due to the travel distance involved and reduced operational capacity of the rest of the group which would be reduced to one truck. This reduction in operational capacity could be escalated if both vehicles become stranded at the site due to flood waters for an extended period of time.

Storing the required gear at Diamantina National Park and flying in to gauge the river appears the most practical solution. Leaving equipment such as a boat, safety gear, a motor and fuel, would allow a light aircraft or helicopter to fly officers in with personal items, camping gear, ADCP plus some fresh food for a gauging trip. The ranger's station at the park would be a suitable location for the secure storage of the equipment. Griffith University's Dust Research Station stored a boat at the ranger's workshop (McTainsh, personal comm). This will require further investigation and planning about the amount of weight that can be taken on the plane so that extra items like Doppler mounts, camping gear and extra food can be left on site if weight restrictions are likely to be tight. Ability to use the rangers quarters would reduce the need to carry excessive camping and cooking equipment.

Storing equipment at Diamantina Lakes and accessing the recorder by air appears to be the most practical solution. A concentrated effort should be made to organise this so that flows during next wet season can be successfully gauged with minimal delay before departure.

Flood slope and N value for 001203A

Three slope values have been obtained for 001203A. Two slopes from surveys within the gauge pool and one from analysis of

topographical maps. The slopes vary from 0.0002 m/m taken over 255km on the topographical maps to 0.0000929m/m for the 4.2m flood on the 12/03/2006 and 0.0000392m/m for the smaller event on the 16/03/2006. The slope taken off the topographic maps is likely to be larger because runs with a comparatively large slope would be contained within the scope of that analysis. The two surveyed slopes are contained within the gauge pool and the slope would be expected to be significantly smaller. The difference between the two surveyed slopes may be explained by the influence of water downstream. The event that left the top mark was the largest event to that time in the system for this wet season, meaning that extra slope would have been derived from the lower levels of the waterholes down stream. The second event came soon after the 4.2m event and the already raised water level of the downstream waterholes would reduce the slope comparatively. The slope values are similar but slightly lower then slopes surveyed by Martin (1992) in a reach of the Diamantina River, however that slope was influenced by a significant upstream constriction increasing velocities. Nanson *et al* (1988) states that rivers in channel country are morphologically similar, characterised by anastomosing channel patterns that exist over large floodplains along which slopes rarely exceed 0.0002m m^-1.

The long section in figure 3.7, displays why the slope results may not be as conclusive as hoped, with the possibility that fluctuations in the stream bed may have lead to significant variations in the local flood slope. Further surveys of flood slope will be required in the future to aid rating extension. The installation of a BM near the control will allow slope values to be gained over a greater distance and may reduce the effect of the variable bottom in the vicinity of the recorder and should be considered for future works.

The derived N values seem surprisingly large compared to the photos seen in many guides to selecting N values (eg. USGS, 2006). Riggs (1976 sited in Dingman & Sharma 1997) suggests that Manning's N is strongly correlated with water surface slope. This would explain the relatively low slope of the reach being associated with such a high N value despite the smooth banks. The formulas suggested by Riggs (1976) and Dingman & Sharma (1997), which negate the need for an estimated N value, were both investigated but neither produced promising results for this site. Further investigation of a suitable N value for rating extension seems advisable.

Measurements and Implications for Rating

The measurements at both 001203A and 001202A were the first in over a decade and have important implications for rating these sites.

001202A

The Burke River at Boulia would appear to require an entire re-rate from its existing pre-1988 curve. As can be seen in Figure 4.1, all measurements were under estimated by the current curve which was based on measurements in that vicinity (DNRM Hystra database result, 2006). Locals stated that 'Sandy Channel' now carries more water than the 'Main Channel' that has changed has occurred in the 17 years the station has been closed (Ken Bull, Per. Comm.) and that it also usually flows before the Main Channel which it never used too. Both these factors demonstrate why flow may now be under represented by the old curve. The CTF of the main channel also appears to have lowered despite the rocky nature of the control with a stoppage of 1.520m gauge height being obtained on this trip compared to the last CTF obtained on the 06/06/1983 of 1.600m.

With changes in the morphology of the Burke River in the vicinity of the recorder, an entire re-rate of the site is likely to be needed. In addition to further high flow measurements, trips may need to target heights around the stoppage level of the main channel. As can be seen from the measurements in Table 3.2 it is likely that flow will continue in 'Sandy Channel' after the 'Main Channel', on which the recorder is located, stops flowing. An attempt to locate the breakout of Sandy Channel on this trip was unsuccessful. It was apparent however that the breakout did not originate from the gauge pool. Information was gathered from locals and the phone number of the landholder who owns the property adjacent to the breakout was obtained. A visit to this breakout to take photos, obtain a GPS location and possibly perform a cross section would be advantageous in the near future. If the breakout is a stable feature a relationship between the recorder and the flow in Sandy Channel may be possible for medium to high flows, low flows however will be under estimated if 'Sandy Channel' continues to flow

once 'Main Channel' reaches its CTF. A second recorder for 'Sandy Channel' or relocating the recorder are options that should be considered if monitoring low flows is of significant importance. For the time being, with so few gaugings over such a small section of the curve, leaving data unrated for the time being seems advisable until further definition of the new curve can be obtained.

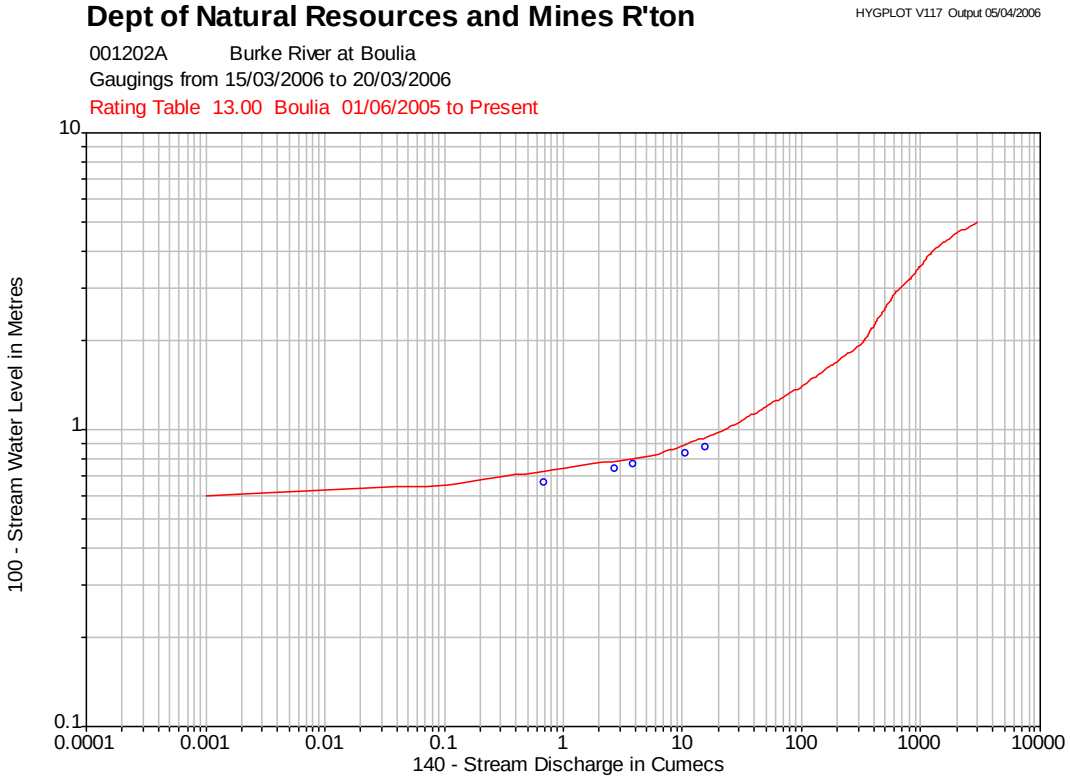


Figure 4.1 Pre- Removal 1988 Rating curve for 001202A and gaugings

001203A

The measurements at 001203A were also under estimated by old rating curve, the gauging deviations are shown in Table 4.2 this is not surprising as the previous highest measured discharge was approximately 2.33m^3/s. The measurement at 0902 on the 17/3/06 was considered poor and un-representative of the real discharge and was not used for rating modification. The measurements taken at 15:07 on the 18/03/2006 and at 12:56 19/03/2006 also fell into the same category. The reasons these measurement were considered poor included the use of poor sections and water velocities being to low relative to the boat speed. Modifications to the old rating curve using 'Hyrated' within Hydstra, were made to the old curve within the areas associated with the measurements on this trip, this reduced the gauging deviations to within +/-5% of the curve for the range of the gaugings seen in Table 4.3. Other sections of the curve remain poorly defined and certainty about the percentage error from the true discharge values will remain unknown till further measurements can be obtained. The new curve can be seen in Figure 4.4. The modification to the curve has increased the mean velocity of the channel at close to bank full discharges significantly but the velocities are still within believable constraints. The difference in mean velocities can be seen by comparing Figures 4.3 and 4.5. The modified rating should be used until more gaugings can be obtained both above and below the measurement preformed on this trip.

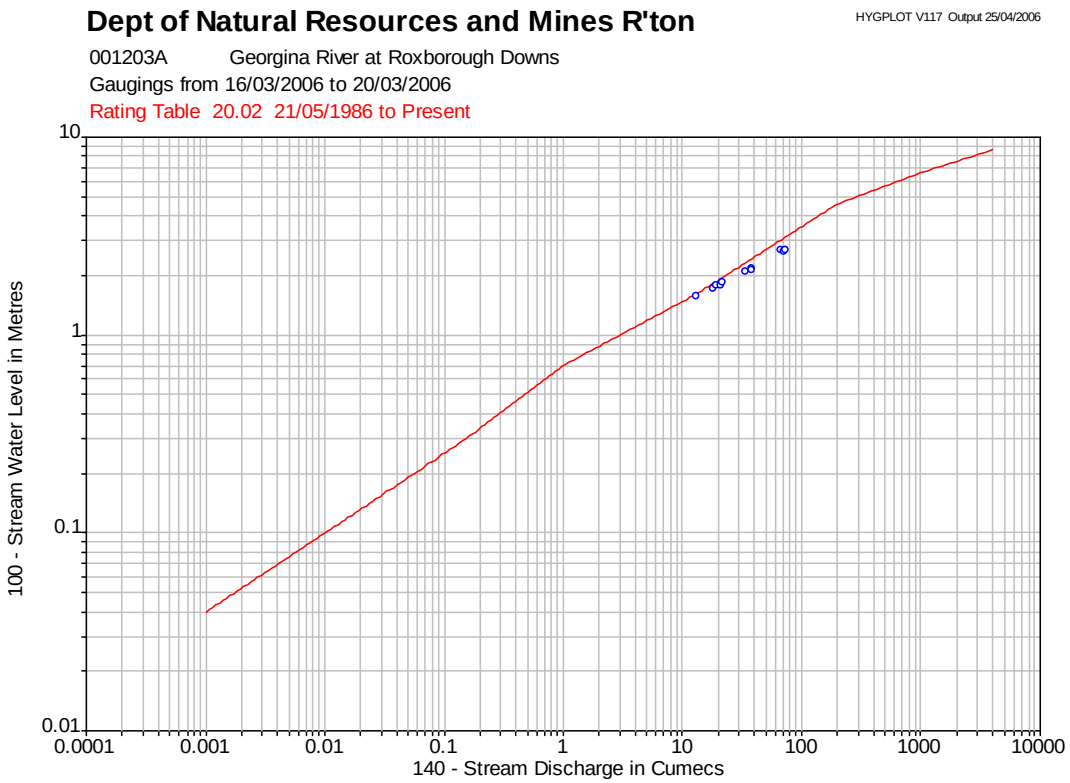


Figure 4.2 Pre- Removal 1988 Rating curve for 001203A and gaugings

Table 4.1- All gaugings at 001203A and deviations from old curve

Date	Stage (m)	Flow (cumecs)	Deviation (%)	Area (m^2)	Velocity (cumecs)
14:12_16/03/2006	4.075	69.86	42.09	308.84	0.226
08:40_17/03/2006	4.098	71.229	41.7	514.8	0.138
09:02_17/03/2006	4.093	65.138	30.21	517.26	0.126
13:50_18/03/2006	3.596	37.149	25.92	484.36	0.077
15:07_18/03/2006	3.562	37.307	31.66	255.47	0.146
18:06_18/03/2006	3.516	33.389	24.58	475.7	0.07
08:07_19/03/2006	3.274	21.518	9.94	463.33	0.046
12:56_19/03/2006	3.2	20.849	18.23	455.22	0.046
13:40_19/03/2006	3.19	19.16	10.23	109.9	0.174
17:59_19/03/2006	3.133	17.916	12.08	108.13	0.166
08:01_20/03/2006	2.981	12.709	1.45	164.44	0.077

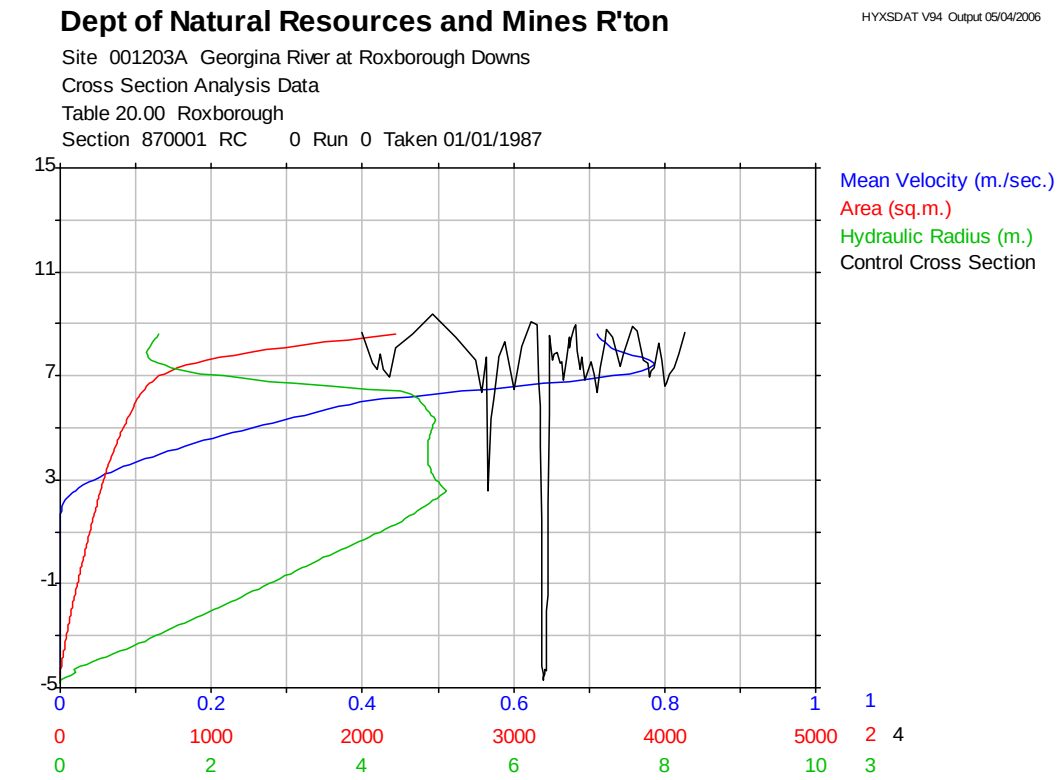


Figure 4.3 Cross section analysis to determine mean velocities as calculated from Pre- removal rating curve

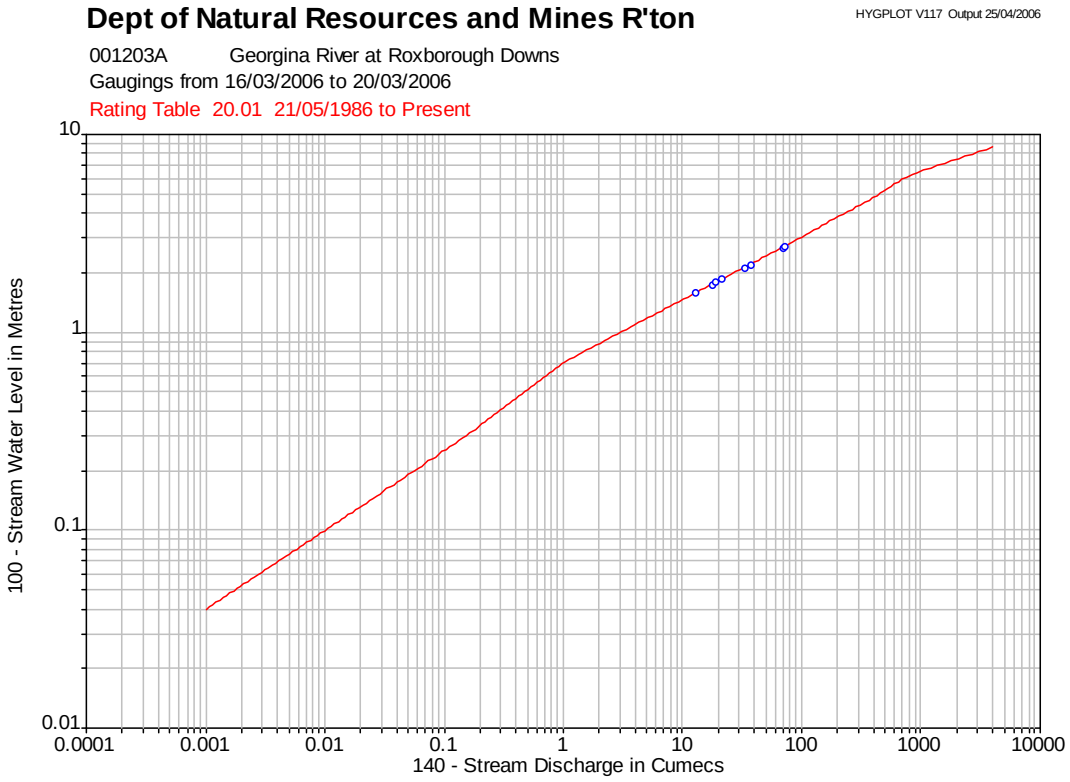


Figure 4.4 Modified rating curve

Table 4.2 Gaugings used in rating modification and deviations from modified curve

Date	Stage (m)	Flow (cumecs)	Deviation (%)	Area (m^2)	Velocity (cumecs)
14:12_16/03/2006	4.075	69.86	1.73	308.84	0.226
08:40_17/03/2006	4.098	71.229	0.95	514.8	0.138
13:50_18/03/2006	3.596	37.149	0.93	484.36	0.077
18:06_18/03/2006	3.516	33.389	2.01	475.7	0.07
08:07_19/03/2006	3.274	21.518	-3.49	463.33	0.046
13:40_19/03/2006	3.19	19.16	-0.66	109.9	0.174
17:59_19/03/2006	3.133	17.916	2.89	108.13	0.166
08:01_20/03/2006	2.981	12.709	-2.42	164.44	0.077

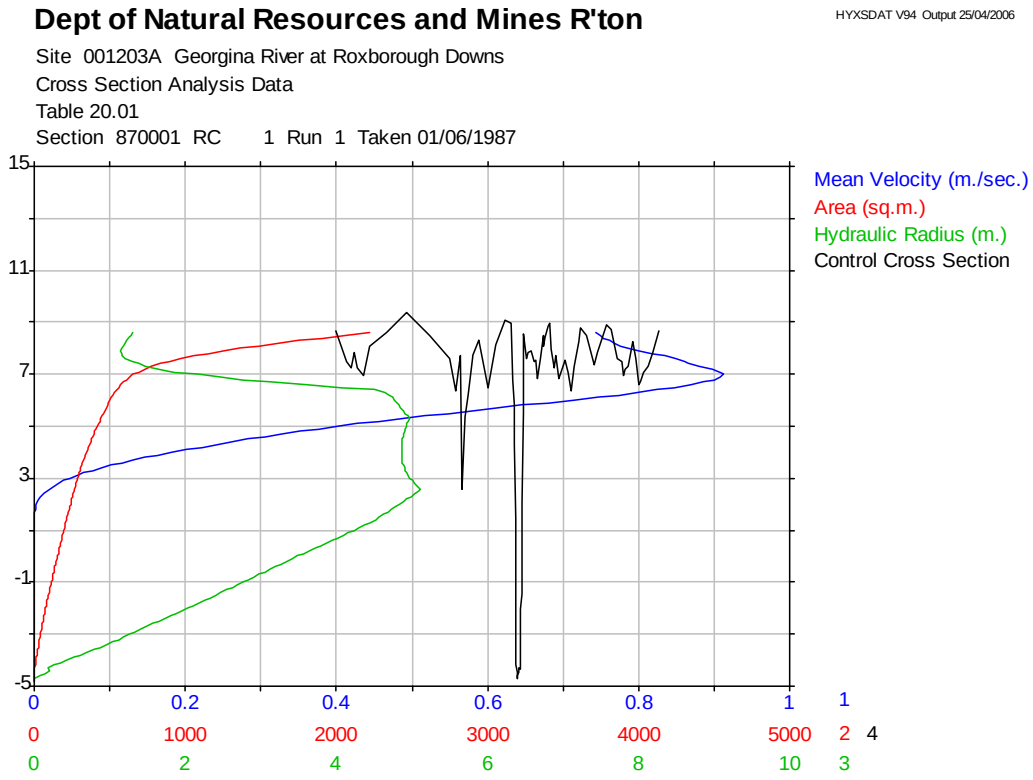


Figure 4.5 Cross section analysis to determine mean velocities as calculated from modified rating curve

5. Acknowledgements

- Boulia Shire Council in particular Ken Bull for the storage of equipment and local knowledge
- Bob's Tyres for providing 2 spare tyres and a battery in the middle of nowhere at a very reasonable price
- Australian Motel Boulia
- John Bryant for his hospitality at Roxborough Downs
- Min Min Encounter for valuable information
- Peter Gordon for leading the gauging trip
- Grant McTainish from Griffith University for information about Diamantina Lakes

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Appendix 1

Trip Log

Monday 13/03/06
- Packed truck

Tuesday 14/03/06
- Completed packing truck 0730-0930
- Drove to Longreach

Wed 15/03/06
- Fixed Darr Recorder
- Loaded boat and fuel from Boulia Shire Council Depot
- Attempted to get to Diamantina Lakes, turned around near 'Warra'
- Measured Burke @ Boulia

Thursday 16/03/06
- Measured Burke @ Boulia Drove to Rox Downs
- Obtained flat tyre
- Measured Georgina
- Walked across LB flood plain, found Mindyalla Ck
- Set camp
- Calculated gaugings
- Named photos

Friday 17/03/06
- Measured Georgina Sampled
- Packed camp
- Replaced tyre
- Measured Burke @ Boulia

Saturday 18/03/06
- Measured Burke @ Boulia
- Obtained 2nd flat tyre
- Measured Georgina
- Set camp
- Measured Georgina

Sunday 19/03/06
- Measured Georgina
- Doppler Long sections
- Surveyed U/S flood marks
- Gauged Georgina *2, U/S gauging better then D/S gauging
- Boated down to control, took photos
- Surveyed D/S flood marks
- Gauged Georgina

Monday 20/03/06
- Gauged Georgina
- Packed camp
- Repaired tyre
- Had 2 tyres and 1 battery replaced
- Gauged Boulia
- Looked for 'Sandy channel' breakout
- Spoke to locals about the location of breakout

Tuesday 21/03/06
- Spoke to Ken Bull about the location of breakout
- Tried again to get into Diamantina Lakes
- Unloaded boat and fuel at Boulia Depot
- Drove to Winton

Wednesday & Thursday 22-23/03/06
- Returned to Rockhampton via Blackall, stopping to fix problems @ 2 recorders on the way back

Australian Hydrographers' Association Educational Grant

The Committee of the Australian Hydrographers' Association has instituted a number of awards/grants to encourage younger (and not so young) cadets and hydrographers to undertake studies in the Hydrography Certificate IV. This has been implemented in 2006 and the following information is provided to AHA members. AHA members are also encouraged to make their employers and others aware of this grant and that the Association wishes to support the development of cadetships and traineeships within the industry, this grant being one aspect of the Associations support.

Along with this Grant the committee has also instituted an Educational Travel Grant (closed end of April 2006) and the Committee is currently considering applicants for this Grant

The following describes the requirements and conditions for the Educational Grant.

PURPOSE

The purpose of the Educational Grant is to:

- promote the principle objective of the Association to further the development of the science of hydrography/field hydrology and its application to the under-standing monitoring and management of Australia's water resources, and
- assist students undertaking the Hydrography Certificate IV (accredited under the Australian Qualifications Framework to undertake the final year Project (Subject 8004AA) as required in the course

THE GRANT

The Grant will be of a value of up to $1000 to assist the students undertaking studies in the Hydrography Certificate IV to purchase material/equipment and services necessary to undertake the Project in the final year of the course.

CONDITIONS

- The recipient will supply an initial abstract paper and a final project paper for

publication in the Association's Journal "Australasian Hydrographer", and win advanced consideration for the right to present the Project paper (describing the work undertaken) at the Australian Hydrographers' Association Conference (at a future date) upon applying for the Conference Educational Travel Grant. (See previous section)

- The recipient will be a financial member of the Australian Hydrographers' Association.
- The recipient will normally be enrolled in the Hydrography Certificate IV (AQF).
- The recipient's project will have been approved by OTEN and/or the recipients employer as an appropriate project activity meeting the requirements of the Project (Subject 8004AA) in the Hydrography Certificate IV.
- Applications will include the approved Project proposal, a budget detailing other sources of financial/material support (for example from the employer/supervisor).
- Applications will be assessed by the Association's Committee who may invite advice from appropriately qualified people. The Committee may liaise with the employer where necessary. More than one grant may be awarded annually, at the Committee's discretion.
- The grant will take the form of a reimbursement to the awarded value, paid to the individual, or as a rebate to the employer that has initially covered the recipients costs incurred, after presentation of proof of purchase of items/services.
- Items purchased with the Grant will become the property of the recipient's institution/employer or in the case of a stand alone student, the student.
- Proof of purchase of the items/services must be supplied to the Treasurer prior to reimbursement if this grant is awarded.

Further information and application forms can be found on the Associations website at ***www.aha.net.au***

KISTERS PTY LTD

Kisters Australian User Group Meeting. August 15 and 16, 2007.

The Australian Kisters User Group Meeting will be held in Canberra on August 15 and 16, at the Crowne Plaza hotel in the city. We have used this venue previously, when it was known as the Parkroyal.

The User Group dinner will be held on Wednesday 15th August at Shaw's Winery and Restaurant, Murrumbateman, about 30km out of Canberra. To assist with transport we have hired several buses to transport participants to and from the venue.

The buses will be leaving the Crowne Plaza promptly at 7pm and returning around midnight. The User Group dinner and transportation is included in the registration fee.

Accommodation at the Crowne Plaza is available and bookings can be made using the following information;

Crowne Plaza Canberra
1 Binara Street
Canberra, 2601
Reservations: 1 800 007 697 - mention the Kisters conference to get the conference rate.

Canberra is likely to be busy in August as there are a number of other international conferences in town at the same time as KUG, so we suggest you get in early with hotel reservations.

Please contact Peter Heweston if you wish to present a paper. Hot topics this year in Australia include the National Water Initiative, data sharing, data publication, resource allocation, irrigation monitoring, key performance indicators, etc.

The keynote speaker at the meeting will be Dr Rob Vertessy, Chief Scientist (Hydrology) from the Bureau of Meteorology.

Cost is $550 inc GST for the two days, covering conference sessions, lunches, and dinner on the 15th.

The Kisters Registration form can be obtained from Kisters email support@kisters.com.au

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"A Technohead Special!"

WATER INFORMATION – Clarifying Its Quality and Making Others Understand.

In case you hadn't heard it but Australia is headed for a Water Utopia future.

Working from the top down in Water Utopia important national decisions regarding water resources will be made.

All these decisions will be based on good science that is, in turn, grounded in good quality water data and information.

This information will be consistent and traceable in its quality and state borders will mean nothing in Water Utopia as everyone will be sharing consistent water information.

As one of those at the wet and dirty end of this chain I ask 'Are we prepared to meet the data demands of Water Utopia?"

Quantitative – Not Qualitative.

"This data is good because it looks OK." How many times have you heard this?

It is a *qualitative* statement. The qualitative statement is often an *intuitive* or *experiential* statement. Intuition does not have bounds and the inputs that go into intuition are not necessarily consistent between individuals. Experience improves ones intuition with the data being assessed and the methodology of measurement and data collection in the field goes a fair way in providing a more dependable qualitative assessment.

Of course some peoples 'intuition' (based on experience) is better than others and, because humans are free thinking, we can't train everyone to have the same repeatable levels of intuition no matter how much experience we think we have. The proof of this statement is clearly exemplified by the footy tipping comp at work isn't it!

What is "Good" quality data? In fact, taking it a step further, what is the difference between 'Good' and 'Excellent' data?

To even begin attempting to define a difference between these two descriptors above, one needs to set bounds, limits and ranges to separate them if we are to discern between them down the track in our data use trail. We are now entering the world of *quantifying* the quality of the data.

A Starting Point?

Hydrographers and field hydrologists collect many types of information related to the water cycle. To do this they use sensors and monitoring systems.

Sensors and systems used in stream monitoring in this day and age are often bench calibrated to within an inch of their lives.

Calibrations these days are very easy to perform with simple and reliable electronic testing equipment and the hydrographer having knowledge and experience with digital electronic systems to assist him/her to understand the calibration information and to set about 'trimming' calibrations in if required.

These calibration processes are often a rigorous part of quality assurance systems with traceable standards, procedures and record keeping of what was done and so on. All this is often done to satisfy the probing of an auditor for whatever quality system a company seeks accreditation for. A concern often expressed about this direction is that the 'system' is being tested, not necessarily the quality of the end product or the way it might be used once it leaves the company.

The moment this nicely bench calibrated set of equipment is removed from the test bench and placed out in the environment, it enters a scary world of heat and cold, spiders, ants, snakes, moisture, dust and probably worst of all - the interfering activities of other human beings!

For the moment let us assume that our bench tested system will behave itself in the real world and since we have gone to the effort of putting a quantitative value on the accuracy of the sensor/system, why don't we use this as one of the starting points for implementing a quantitative data quality system.

Now let's take one of the basic parameters that we, as hydrographers, measure - Water Level. Guess what there is another starting point we can refer to in defining the accuracy of our water level data – Australian Standard 3778!

We now have two 'measures' with which to begin defining the quality of the water level data collected. But before we attempt to define the data

we need to pause and consider another dimension that will affect how the data is stored and managed once we define its quality.

Our Binary Fetish

Have you ever noticed how, when you delve behind the scenes in our extremely computer driven hydrographic environment, there is an underlying theme in many of the things we do?

It is the binary numbering system.

Data loggers have binary storage capacities, computers have binary gizmos and systems, sensors have binary bit ranges and internal binary compensation systems. Even the body pushing the buttons on those loggers and keyboards developed from a binary division system at conception in the womb!

In our binary world mentioned above the Australian Water Data World appears to have inherited a binary set of available 'numbers' to be used for quality code systems within the primary water information systems in use in Australia. In fact there appear to be 255 of them at last count!

(OK, I know 255 isn't a binary number but they often leave that last binary bit out to be used for some mysterious computer check sum or something of that nature!)

Having worked with a number of entities one thing I couldn't help noticing is that while everyone had the same binary based set of numbers, the meta data description attached to them for defining quality could be vastly different – not just in descriptor but in interpretation of what quality is.

Another amazing thing that is noticed is that some entities take great delight in attempting to utilise every one of those available 255 quality fields. Why? Because they can!

It is with 30 years of hindsight on this point that the developers and users of our water database management systems have admitted that perhaps the worst thing allowed in the water data world was not hardwiring a quality code system into the systems but permitted the users to define their own qualities – allowing them 'flexibilty'.

With flexibility comes diversity. With diversity, at least in water data and information, comes *potential incompatibility.*

Even just having 255 codes available (it could be worse, you could have 512 or any binary number following) is not the real issue – its those 255 blank fields in the codes database that are available to the *imagination of the water database administrator*!

The administrator *possibly* bases what he puts into those blank fields on the limitations of the parameters being stored – it is hoped that he/she might base that on the limitations/accuracies of the monitoring systems , procedures and techniques that collected the data. That is the data administrator has first hand experience with the complexities and nuances of measuring water level!

But before we let the system administrator fill 255 blank fields we need to ask ourselves – do we need to use all of them or lots of them just because they are there?

The proposal here is that we don't need that many and can reduce the number of available numerical quality codes/tags required.

So lets have a go.

Water Level Quality.

Start with some simple and defined measureable limits.

Section 5.2.4 of AS3778 – 2.2 states:

'For the measurement of stage in certain installations an uncertainty of +/- 10 mm may be satisfactory; in others, an uncertainty of +/- 3mm or better may be required; however in no case should the uncertainty be greater than +/-10mm, or +/0.1% of the range of the measuring device, whichever is the greater(see ISO 4373)'

Without debating the finer points of sensor ranges lets just take the +/- 3mm as a starting point

(Why +/- 3mm you ask? Think about what water level used to be measured in prior to the 1970s – feet, or more precisely down to 0.1 inches, which when converted to metric is 2.54mm when in turn rounded up becomes 3mm!)

Next consider the limitations of the monitoring system, and the range it is being expected to operate over. Sensors have claimed manufacturers accuracies. Let us take the case of a pressure sensor with a claimed accuracy of +/-0.1%. If it is

a 5 metre range the accuracy will be +/-5mm. While it is acknowledged that coupling a sensor with the next part of the monitoring system may introduce other inaccuracies, let us limit ourselves to the sensor end of the system and assume that in the perfect bench test world that any data transmission errors from the sensor have been '*total system'* calibrated out.

If a water level data system has been calibrated to be well within this +/- 3mm specification over the length of its range then so be it. A *regular system calibration* check will then keep this measureable part of the data chain up to scratch.

Now place the calibrated system in the field – that world where the nasties live. There is a myriad of things that can affect how accurately the system will now record the water level. Through good site selection ***and*** good ongoing management of the site these potential impacts can be negated to a great extent but naturally monitored systems have ways of making a data collectors life difficult on occasions – I won't list here what might happen – I'm sure that everyone can relate a different cause and effect that some stream has done at a gauging station at least once in their lives.

Once the system is placed in the field we reference the data being recorded to a datum – often a gauge plate in the water that is in turn survey referenced to a stable bench mark. The gauge is read and water level data at the system end referenced and set to the staff gauge reading with a zero error. At this stage let us assume that our gauge datum is solid and dependable – of course we know it is because we also conduct *regular survey calibrations* of our datum as part of our QA don't we?

Then at some point in the future, regular site maintenance visits occur where the system data is checked against the datum. Over time a history of reference information for the data being recorded is collected – a time series of calibrations in itself that we can start assessing the quality of the data and adjusting the data to correct the inconsistencies.

If we are satisfied that our staff gauge is maintained effectively as previously discussed then we have, for the purposes of measuring water level, we have our primary reference on which to base our quality coding of our water level data!

But wait, there's more! Most hydrographic installations in Australia have gauge plates with 1 cm increment markings, so where does that leave us in terms of reading a level from the staff gauge? It is generally accepted that gauges are able to be read to within +/- 5mm in perfect water conditions i.e. steady pool with no wave action etc and that the observer is trained in reading gauges and understands parallax error and how to minimise its impact on the accuracy of the reading, the reading of the gauge from the bottom of the meniscus and so on.

So in reality our accuracy for measuring water level is actually +/-5mm, even though the claimed accuracy of our monitoring system is +/- 3mm!

But recording the correct level isn't everything – timing of the data point is also an issue, though probably not of as great an issue as getting the water level accurately. Given that the majority of data is now recorded via digital systems utilising highly accurate clocks then it is probably reasonable to place a time dimension on the data point and for the moment we will call that +/- 10 minutes and incorporate this in our quantitative descriptor as well.

So after this long winded road to actually measuring a water level, and placing an accuracy on it, we are now ready to put a quantitative measure on our water level data.

For the purpose of the exercise I have included some of our binary codes as a reference point. In a following article I intend expanding on how the ideas on coding data then gets extended into other variables, such as water quality, and methods and techniques for other 'data' such as rating tables.

In the following table I have also included some estimated data codes for water level. The concept here is that in the occurrence of a system failure or problem with recording the water level it may be possible, if the stream conditions at the time are steady/stable, that an estimate of the data may be more suitable than leaving poor or even no data in the database.

This concept intimates that a Good Estimate in reality **shouldn't be any better than actual recorded** Fair Quality data.

I accept that some will argue this point, but an estimate is still only an estimate regardless of how good the practitioner's intuition/experience or the techniques used are in estimating the data.

The assertion here is that ***a qualitative assessment of data should not be accorded greater accuracy than a quantitatively measured data accuracy***

Quality Code Description	**QUAL CODE**	LEVEL
Good Data	**1**	Record Processed ± 5 mm, time within ± 10 minutes. No correction of data necessary when referenced against observed datum at time of data reference point
Fair Data	**21**	Record processed ± 10 mm, within ± 30 minutes. (Code may be affected by recorder type.) Referenced against observed datum at time of data reference point
Good Estimate	**22**	Estimate based on accurate techniques and other information (eg debris marks in formed channels) to an accuracy of ± 20 mm, time within ± 2 hour and QA procedures
Poor	**31**	Record Processed ± 50 mm time within ± 2 hours Referenced against observed datum at time of data reference point
Fair Estimated data	**32**	Estimate based on accurate techniques and other information (eg debris marks in formed channels) to an accuracy of ± 50 mm, time within ± 2 hour and QA procedures
Poor estimated data	**42**	Estimate which reasonably reflects the actual event Edit comment/s shall be inserted in the data file explaining method of estimation and / or collection >100 mm, time within ± 2hour and QA procedures
Data Not Recorded	**151**	Data was not recorded. Metadata comment to be inserted in the database

So we have astarting point with one of the parameters that we measure.

The next article on this issue will deal with expanding the table to include other water parameters, measured and calculated while keeping the number of codes used to a minimum! (What could be easier!)

Membership Renewals

At the recent AHA Committee Meeting in May, it was agreed to hold membership fees at the current rates.

Membership renewal reminders will be distributed soon, encouraging your continued participation in the activities of the Association.

Those who will receive them will notice that the hard work is done for you and the information you last provided to the Association is already filled in!

Its as simple as correcting the information (if needed) and returning the form with your payment to:

The Treasurer
Australian Hydrographers' Association
14 Kosciusko St,
Traralgon, Victoria 3844

Payment Options

The Association accepts payment of subscriptions by cheque, credit card and Electronic Funds Transfer. If you wish to debit from your account direct to the AHA account please email the treasurer to get our bank account details for EFT. (treasurer@aha.net.au)

Corporate Memberships

4 levels of Corporate Membership are offered as follows:

Corporate Membership Grade	**Annual Cost**	**Included Membership**
Bronze	$500	1
Silver	$1,000	6
Gold	$1,500	12
Platinum	$2,000	20

Main features of Australian Hydrographers' Association Membership (for both Individual and Corporate) include:

- Knowledge and information sharing amongst peers.
- Promotion and sponsorship opportunities at a biennial conference.
- Four journals, *Australasian Hydrographer*, per year.
- Association Website and peer group mailing list with discussion threads.
- Commitment to supporting continuing education of Hydrographers (Certificate IV Hydrography).
- Travel grant assistance scheme for student/cadet members to attend conferences.
- Educational grants.
- Job advertisement network to industry.
- Investing funds for educational support for hydrographic industry (Member of Industry Advisory Group).
- Supporting State based industry workshops.
- Access to and information about activities from other similar scientific and industry groups

ARTICLES FOR THE JOURNAL

I will admit that articles are getting a bit thin on the ground at present.

I'm sure that we all have some interesting trips or ideas we'd like to share as well as interesting images of hydrometric work.

So why not get them to me for inclusion in the Journal.

If you forward me articles in word that would enable me to cut and paste easier into the Journal when preparing it.

Your Diary - 2007, 2008

Some dates to think about.

- KISTERS User group meeting August15/16 2007. Canberra
- AHA AGM 15th August 2007, Canberra**.**
- HYDRO 2007, Focus on Asia Australasian Hydrographic Society (Our Salty Friends!), Cairns, November 2007
- 14th AHA Conference, tentative dates sometime June - August, 2008. More details to follow
- Late 2008, New Zealand Hydrological Society Workshop/Conference, South Island.

AHA Office Bearers and Contacts

Chairman, Bill Steen,
chairman@aha.net.au

Secretary, Michael Whiting
secretary@aha.net.au

Treasurer, Max Hayes
treasurer@aha.net.au

Publicity Officer, Mic Clayton
publicist@aha.net.au

Public Officer, John Skinner

Committee Members, Bill Barratt, Paul Langshaw (interim appointment).

2007 Year of Hydrography
Celebrating over 100 years of water measurement in WA.

2007 will be celebrated as the year of Hydrography within the Department to recognise the contribution hydrography has made to the development of Western Australia and the ongoing resurgence of the water measurement profession.

To celebrate the occasion, a program of activities will be undertaken including:

- Official launching of the "*Year of Hydrography*" by the Minister for Water Resources at the department's Hydrologic Technology Centre.
- Email signature block for measurement officers (as above);
- a Department of Water letterhead for use by all staff;
- a display of hydrologic instrumentation through the ages in the central office's new foyer;
- presentations of commemorative certificates to this year's graduates of the Hydrography training program;
- interesting facts incorporated in the department's internal and external newsletters
- celebratory awards presented at the state's Water Awards scheduled for October 2007
- a presentation to the Australian Water Association
- the development of a strategic plan to meet the state's growing future hydrographic requirements.

Bill Bunbury, a well known ABC National Radio journalist and presenter of the social history program, Hindsight, has been commissioned to write a book and produce a CD about the evolution of hydrography in Western Australia.

The book will be presented in a serious but light-hearted and entertaining manner, capturing the many characters who have contributed to the industry.

Expectations for an enjoyable series of yarns and anecdotes are high as Bill will visit many old hands for one-on-one interviews to uncover those long forgotten memories.

Some Advice for us from the Ministry of Construction, Japan

(Source: Hydrological Observation Explained in Pictures)