AUSTRALIAN HYDROGRAPHERS ASSOCIATION

Australasian Hydrographer

Extreme Gauging!
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THIS ISSUE

EDITORIAL

Where I live a funny thing happened over the last couple of months. The water went away.

At the beginning of December our local council asked ratepayers to go into a voluntary water restriction mode, with the intent being for us to show support and understanding of the impacts of the drought severely afflicting other areas of our shire area. On Christmas eve the council did an urgent letter drop to all ratepayers that we were going on immediate Stage 3 restrictions. No lawn watering, limited hand watering etc.

By the middle of January our bit of river from where the town sourced its water had stopped. All this occurred within six weeks.

There are virtually no large offtakes from the river upstream of us, mainly stock and domestic, and any larger licences were directed to cease pumping via their water licences at trigger levels set by the state water authority.

I thought I understood how our river worked, that's my job and as a TV ad said many years ago, "I know boats". I assumed that since virtually all takes from the river had stopped that one should see an increase in flows down the river so what was coming in one end was greater by the time it got to our town offtake. This would occur due to many smaller tributaries and groundwater entering the system to provide a baseflow that would increase as you moved down the catchment.

The problem was though was that it wasn't. It was drastically reduced. The losses were too great even allowing for the takes upstream so obviously my immediate thoughts were that someone was doing the wrong thing and taking water illegally from the system. I considered the size of the pumps required to take the amount of missing water – they would have been many times bigger than the pumps for the town supply and you can bet your boots that if someone was doing something wrong the neighbours would have advised the authorities.

What was going on? On a blisteringly hot day in January, with the ice cream melting rapidly in my shopping bag I was accosted by my kids' school bus driver and his mum. They wanted to talk about the river – the ice cream would have to suffer.

Being real 'locals', not a blow in like me, they suggested the river was going back into the ground – that was their experience over many years of living on the river upstream of town.

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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.

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e - mail publicist@aha.net.au , or
PO Box 843, COOMA, NSW, 2630.

(Continued from page 1)

After talking to them for some time I went home and, not having viable ice cream anymore, sat on the veranda with a beer instead and thought about the river and its surrounds. I put some information together, a mix of 'real' water data and anecdotal evidence from locals.

My current hypothesis is that the surface water/groundwater interaction has reversed in recent times due to lack of groundwater which has diminished due to the drought and the strata is sucking surface water into it and this is being compounded by kilometres of stream side vegetation (both willows and native) lining the river going at the water that's left with hammer and tongs to survive the drought.

I don't know if my hypothesis is correct. There is no monitoring taking place in my little stretch of the river to understand what is going on. If we don't understand how our river reacts under various conditions and stresses, how can we manage a sustainable use of it

Dollars and resources are limited for stream monitoring and analysis networks across Australia, not just for my little bit of river. Regardless of whether or not the proposed ten billion dollar bucket of money gets up and going, the reality is that there needs to be an increase in stream monitoring to improve our understanding, and hence management, of our nations water resources.

Post Script:

As I put the finishing touches to this Journal, the causeways in town have been closed for about the eighth time in 4 weeks, as flash floods rip though yet again taking out the bridges on the shared cycleway (that the council has only just reinstalled, again), 3 watering holes in town have been struck with disaster – two got flooded and another was struck by lightning in one of the storms. My little stretch of river has been running a dark muddy colour, going rapidly up and down with every passing storm cloud. The bus driver is complaining about how muddy the road has become. And I still don't know if my stretch of the river is going into or coming out of the ground water table!

Mic Clayton, Editor and Publicity Officer

Water, Water Everywhere

On Australia Day the Prime Minister, the Hon. John Howard, announced a plan for securing the future Australia's water resources. The thrust of the speech was the in regards to the management of the Murray-Darling Basin system as well as a focus on northern river systems and the capacity to use them for agriculture. Various issues were outlined in the speech and there was emphasis placed on better water information management and standards.

The following are excerpts from the speech in relation to aspects of water information that are relevant to our science of hydrometry and water monitoring.

'Let me also speak directly to the scientists, hydrologists, engineers, economists and others who have spent years working on the Murray-Darling Basin – often with inadequate resources and in fragmented institutions.

The Australian Government values your expertise and experience. Indeed, we need them to forge a new era of common purpose.

Better National Water Information

Australia's water scarcity problem also requires that we measure our water resources and our usage of them far more accurately. You cannot manage what you cannot measure."

"Our plan for the Murray-Darling Basin, for example, calls for better understanding of supply and demand at a catchment level, irrigation district level and farm level."

A transcript of the speech is available through our website www.aha.net.au or through the National Water Initiative website www.nwc.gov.au

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AHA Proposal to the National Water Initiative

Our Association's funding proposal to the National Water Initiative is still with the NWI.

Over the last couple of months we have had ongoing contact with the NWC regarding the proposal, addressing finer points of how the proposal will be conducted.

Description of the project:

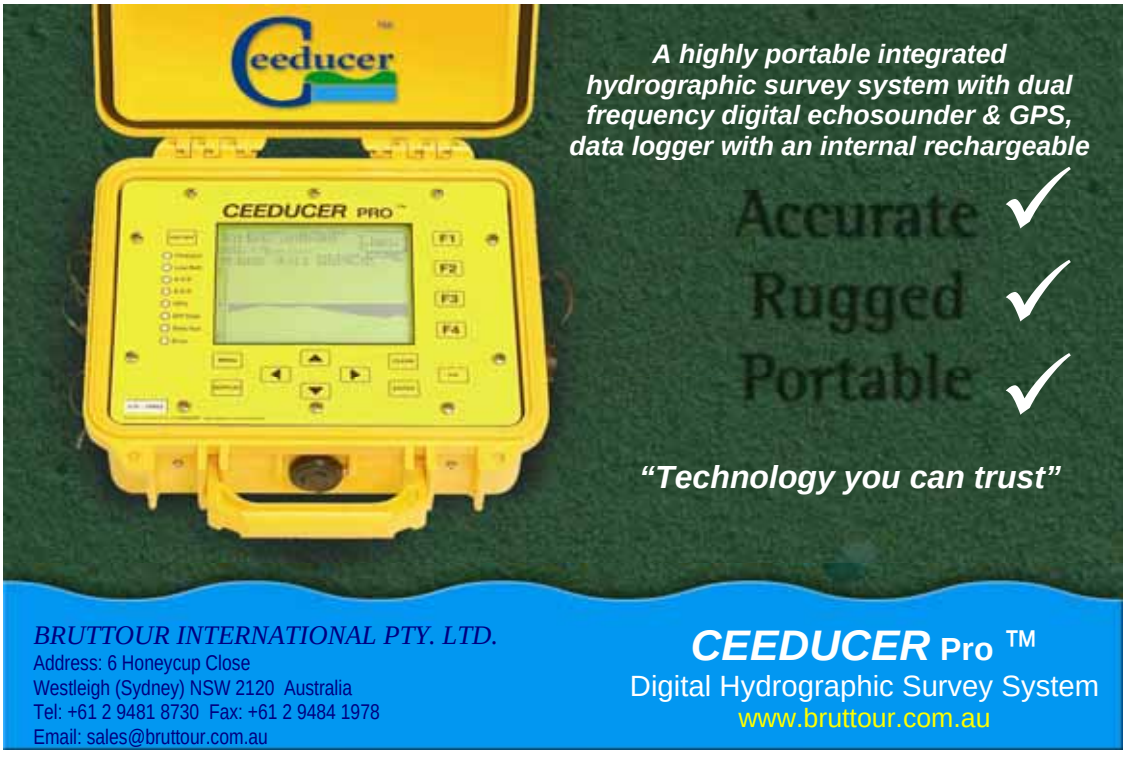
Aims and Objectives:

- To develop a national standard for data parameter and data quality definition standards for the storage of the major water database information parameters of stream/water level, flow ratings, precipitation, water conductivity and water temperature.
- Identify and conceptually develop the tools/methods required to migrate data from state based water information systems into national and cross regional water management databases so that data used from within these final data sets is comparable in terms of data quality.

Relationship with NWI and Benefits:

This proposal aligns itself strongly with the need for national standards for water data parameters and data quality required for consistent and comparative national water accounting and reporting requirements.

Water information database parameters and data quality application are not consistent among the lead agencies responsible for water management/water information database systems in Australia and this proposal aims to develop standards for primary water resource parameters and associated data qualities that will improve the ability to compare different modelling and analysis processes used for water resource management as the quality of the input data for these processes will be consistent.



A Kiwi In Australia for a Few Days

Or a New Zealand perspective on the 13th Australian Hydrographers Conference in Darwin

Martin Doyle, Tasman District Council, New Zealand.

Luckily Doug hadn't started to pong by the time his bags caught up with him. By then we were in the opal town of Coober Pedy, heading to the Top End from Adelaide. **Mike Ede, Doug Stewart** and I had decided to drive the Stuart highway to the Australian Hydrographers Conference in Darwin, and allowed ourselves 7 days to do so, as after all it was only about 6 inches on the map.

Opals consist of up to 10% water, which isn't enough for any self respecting hydrologist, so with Doug's bag in the boot we headed north. We had been keeping an eye open for water, but in this regard we were not successful until about 1,500 km into the journey, when a 300 km side trip out to the Olgas rewarded us with a small trickle, followed the next day by a clear pool in the Kings Canyon area. Both the Olgas and Kings Canyon were spectacular rock formations, in a large part due to the colours - reds, oranges and greys catching the light in different ways at different parts of the day.

If we had stayed on the Stuart highway, I suspect we could have driven for around 2,200 km before we saw any non reticulated water at all. Tap water came from bores throughout the red centre, complete with what the locals call "a bit of a tang", and it proved a bit hard to swallow for those of us raised on gravel aquifer supplies. The supply for Alice Springs didn't taste too bad, but it is pumped from 151m below ground level, and the water table is dropping around 1m per year. Interestingly, while we were constantly reminded by signs about water conservation, Alice was quite a green town, and throughout our trip we enjoyed that great Aussie luxury – the firehose shower. Not a real firehose of course, but large quantities of water come blasting out of a great wide showerhead – great for the showeree, but surely not good for water preservation. I consider it's worth moving to Aussie simply to get away from the piddly showerheads we use here in NZ, although it'd be prudent to hold a return ticket for the day when the water finally runs out over there.

I reckon the early explorers Stuart and Burke were stark raving. Burke died during his return to Melbourne having crossed Australia from South to North, and Stuart finally crossed the continent on his 6th attempt, and made it back home to Adelaide again. The whole time we travelled the 3000+ km across the continent I tried to put myself in their shoes, but it was hard to imagine just how difficult their trips must have been. Of course the Aborigines had been successfully living in that area for tens of thousands of years, but we Europeans seem to need a Robert Burke to do it the wrong way to bring home the extremes - no need for an aboriginal guide for these guys. I could image the joy the explorers must have felt when they reached the flowing streams up north, particularly if they stumbled onto any of the lovely waterfalls and pools that exist in places.

After a long dry trip we drove into Katherine where water flowed all year round, and it was great (professionally) to see where the floods had been recently, a spectacular rise indeed. We allowed ourselves a short bypass through Kakadu, and by a big uranium mine plonked in the middle of the World Heritage Park we spotted a water level recorder which we stopped to view. A sign warned of crocs, and while it was pleasing to see that health and safety was given due consideration, Mike and I were keen to see one in action, so Mike hid the sign from Doug until he went down to read the staff gauge. Our bait proved no temptation however, and it was with Doug still utilising his allocated space in the car that we carried on into Darwin and the conference.

Mike Ede wonders how any work gets done in Kakadu National Park

Many Kiwis will remember **Eric Valentine**, now based in Darwin, who once worked in the Hydrology Centre in Christchurch. Eric kicked off the conference as first keynote speaker, and gave an entertaining and thoughtful presentation on the use (and traps) of hydrological models, and data analysis in general.

The remaining presentations were varied and interesting. A number discussed data transfer, including Robert Thompson's description of the Enviromon system the Met Bureau uses to collect its information for flood warning. A mixture of radio telemetry and internet based systems collects the data (event based, so the data is sent from the field as it happens, not pulled from the office), and provides email, LAN, SMS or pager alerts to groups of users. The flood warning setup in Aussie is different to NZ in that the Met Bureau employs hydrologists at the Federal level who run a flood forecasting service, this dovetailing with work done by local agencies.

The Murray River was of course mentioned in a number of talks, and Damian Skinner described the water data management project he is involved in on that water body. With the Murray flowing across state boundaries, and multiple users competing for water, and data being provided by various agencies in number of formats, the project aims to integrate this information into Hydstra, and Kisters have done considerable development work to allow this. It was shown how Google Earth was used to display the information.

The conference also had a section dedicated to ADCPs. Dave Williams gave an excellent talk on the evolution of the use of ADCPs in the Northern Territory. It was apparent that these devices have proved a great leap forward in this region in particular, with the difficulties they face with large rivers flowing over wooded floodplains (or townships) during the monsoon. During one large flood in Katherine he described driving the boat up the main street and along the highway, which provided an excellent bottom for the ADCP to track along. Conventional current meters

appeared to be little used in this area now, and this trend is likely to spread wider. None-the-less, with the extremely turbulent rivers we see here at times, I couldn't help thinking that some use of conventional meters and POEMs will be required in New Zealand for some time yet.

Perhaps the most interesting talks for me were those which described the work done in the two regions of the Northern territory – the arid area around Alice Springs and the monsoonal northern part. Allan Russ described the challenges the arid region threw up - field trips of up to 3,500 km, often with extended parts of the trip on rough tracks. On one trip, they suffered 5 flat tyres before 11am, and on another they seized the motor of a vehicle with 7,000 km on the clock (was this just 2 field trips?) due to grass seeds blocking the radiator. They measure a lot of bores, and surface water appears only occasionally. One set of photos taken 10 seconds apart showed a flood arriving at bridge over a dry river bed, and this was fascinating to see for those of us used to rivers with water in them all of the time. One study they did involved emptying beer cans on site, and burying them in a sandy river bed, and then after a flood finding them with a metal detector. The top 3 metres of cans were gone, despite no apparent change to the river bed. I did wonder if perhaps they forgot to drink one of the cans placed lower in the strata, and someone snuck back later to retrieve it. Anthony claimed that in Alice, they were the closest to all beaches in Australia, and I could see that the benefits of this were substantial.

The northern part of The Top End had a different set of challenges. Virtually no rain falls for 5 months of the year, but the monsoon sets up during summer for around 4 months, during which time around 1,800mm falls. In the old days the field teams would sometimes go out for 3 months at a stretch during the wet, living under canvas and no doubt suffering daily deluges, with humidity at extreme levels. Now a 2 week trip is more likely, with most dirt roads impassable to normal 4WD's, and access to sites requiring quad bikes and helicopters. Spectacular thunderstorms occur every day during summer, which by all accounts are quite something to see. Bushfires can play havoc with equipment. For us Kiwi's the idea of crocs and snakes is a bit daunting, but to the locals these appear to be mere annoyances. Hand guns were able to be carried in case a shot across the bows was needed at any time.

On the technology front, Mike Lysaght discussed the value of the human resource to the hydrological community, and displayed a GPS and sat phone enabled device he had been trialling which enabled base staff to find field staff if they were overdue. Data could be sent back to base at set intervals, or the base could find out where the vehicle was (if needed for safety reasons), although apparently there is no satellite coverage around the local pubs. The German company Ott will be recognised in NZ for the current meters they make, but they have much wider product line than this. They introduced 2 new raingauges at the conference – one a weighing bucket system and the other a laser based device that measures drop size and velocity. The weighing bucket principle is well known to those who measure snow here in NZ, although the modern system seems a vast improvement over the detested mechanical device we wrestled with in the past. Bill Barrett also showed a new battery powered traveller for unmanned cableways.

Several Kiwis gave talks. I gave an overview to the Australians of some of the conditions we see here in NZ, **Jeff Watson** described the work they are doing in the Manawatu, and **Phil Downes** showed a little of the work done in Canterbury, with emphasis on the Wainono lagoon.

During the conference dinner several actors came along and involved the hydrographers in a touch of theatre sports. Those that had had enough to drink ventured up on stage, and were required to perform in some way, the unluckiest having to make up a song on the spot, with others required to continue a rhyming poem which the person in front had already added a line to. **Andrew Willsman** provided some entertainment acting as an interviewer, while another person knelt behind him using his arms as though they were Andrew's.

Some good stories were told around the tables. My favourite involved a young cadet (recently arrived from Scotland), who was sent out from the Friday booze-up by his boss to settle an argument about the size of a local stilling tower. The boss told the young guy to take the bigger bosses car, and on arrival at the site opened the hatch to the

tower, only to have two snakes fall out on top of him. Panicking, he looked for a stick and finally opened the boot to find an axe, with which he dispatched the two snakes, although he did miss several times and hit the steel rungs of the ladder. The argument regarding the tower diameter was duly settled, but it turned out the bigger boss was a woodsman from days gone by, and had treasured his axe from that time, polished and honed as it was. Well, the boss got a right tune up from the bigger boss about the whole business, and as he left the room with head hung low, the bigger boss called him back. "Oh and Paul…." he concluded wearily, "next time, employ a bloody Australian will you….."

Away from the conference, I noted that virtually every edition of the larger newspapers carried an article on water, usually focussing on dwindling supplies, in much the same way that we were getting a daily reminder on water quality issues here several years back. I was able to actually look down on the Murray River from the plane as I read an article which appeared to finally confirm plans to bolster the Murray flow by buying back water from the irrigators. Recycling of water in municipal supplies was also often discussed.

Comparing hydrometric data collection across the Tasman, my impression is that the countries are in broadly the same position. One benefit of operating in a smaller country means that we still have reasonably cohesive hydrological procedures across the nation compared to Australia, with obviously a lot of interaction within Niwa, and also between the Councils via the LAEMG group. It seems to me that Kisters, as the dominant hydrometric software provider in Australia, performs a valuable standardisation role in that country. Another impression of mine was that we may have been quicker adopting new comms and telemetry systems, but the Australians are further ahead in other areas such as ADCPs. I felt that overall, a hydrographer/hydrologist from either country could cross the ditch and fit in to another operation with relative ease. What's more, they would be welcomed – both countries are struggling with a shortage of skilled people in this area.

I would recommend attendance at AHA conferences by any New Zealand field hydrologist, and think that increased interaction between the groups can only allow both sides of the Tasman to improve their data collection and data handling practices. In particular for the future, a joint workshop to consider the differences in practices across the Tasman would be of great benefit, as there is no doubt that superior methods and technologies exist in different areas on both sides of the ditch.

My trip was helped by a travel grant from the Hydrological Society for which I am extremely grateful, and also partially funded by the Tasman District Council who also deserve thanks. Finally, the Kiwis who attended were very appreciative of the welcome reception given them by the Aussies.

Editor: Much thanks to Martin for supplying this report which first appeared in the NZHS newsletter 'Current', Nov, 2006 edition.

An OH&S Lesson For Everyone

At the conference Mick Lysaght of Hydrological Services brought us a presentation on safety with respect to the safe locating and positioning of people in the field. The important thing was that we are the most precious resource in our workplace.

This following item came across my desk and I felt to continue a safety theme in future editions of the Journal perhaps some items on safety could appear and this is being a first instalment.

Confined spaces are an issue that occur in many industries. Sewer monitoring installations immediately come to mind as an area that hydrographers are exposed to these environments but the situation can occur in other areas.

Most experienced and trained hydrographers would have undertaken confined space training or awareness of confined spaces as part of safety training programs provided by employers.

River stilling wells as well have the potential to become a hazardous environment. Wells are recognised as a potential hazardous location, particularly in times of flushing out when disturbance of silt and decaying litter, animals (or whatever!) can liberate gases that displace the available oxygen. Many authorities in Australia do not permit access down wells to them unless appropriate monitoring and confined space procedures are conducted – much like sewers in a way.

The following excerpts from a press release from the Ministry of Mines in British Columbia highlights the potential for work places and work sites to become hazardous. The building bears a great similarity to many installations used around the world for water monitoring activities.

Reading the evidence available in this article it is obvious that a major contributing factor to the event was the potentially hazardous tailings waste that was being monitored.

SULLIVAN MINE REPORT CONFIRMS UNPRECEDENTED INCIDENT

CRANBROOK, British Columbia – The tragic circumstances that led to four fatalities at a water sampling shed at the decommissioned Sullivan mine on May 15 - 17, 2006 was an unprecedented incident caused by an oxygen-deficient atmosphere, the Province's chief inspector of mines Fred Hermann has concluded.

"The incident was caused by an oxygen-deficient atmosphere. However, previous to this incident, there was no indication of a problem at the sampling shed or anywhere on the mine site," said Hermann. "We have clearly established the cause of death of the four victims, but this accident is unprecedented in the history of mining and the process that led to the oxygen-depleted atmosphere has not, to our knowledge, occurred anywhere else in the world."

The incident claimed the lives of Doug Erickson, a Pryzm Environmental consultant working for Teck Cominco, Bob Newcombe, an employee of Teck Cominco, and BC Ambulance Service Paramedics Kim Weitzel and Shawn Currier.

The chief inspector of mines presented his conclusions as well as recommendations to further ensure the safety of workers and rescue personnel at all mines in British Columbia.

The chief inspector of mines' report includes the following conclusions:

• The accident was caused by the accumulation of oxygen-depleted air within the shed. This atmosphere was unexpectedly mobilized from within the dump, entering the shed through the drainage pipe installed to direct water from the collection ditch to a treatment facility.

• The lack of any prior indication of a hazard at this sampling shed contributed to Doug Erickson and Bob Newcombe entering the shed without concern for a potentially hazardous environment.

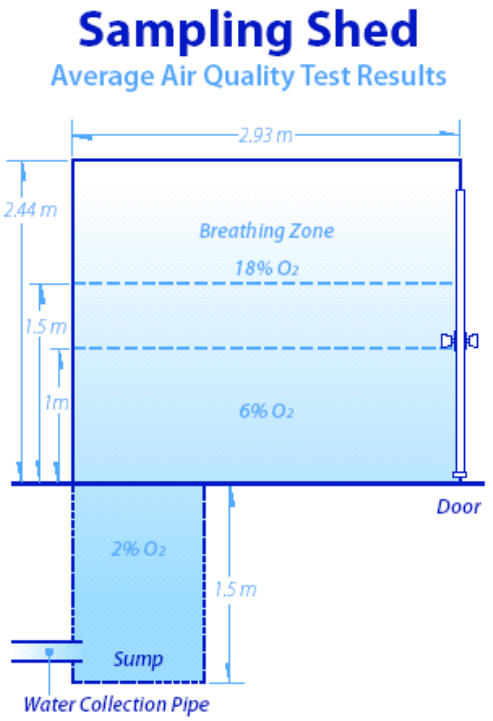
• Kim Weitzel entered the shed with the understanding that she was responding to a drowning. On her way down the ladder she uttered an exclamation and questioned the presence of gas. By the time she asked that question it was too late for her to extricate herself.

• Lack of basic hazard recognition training and experience contributed to the loss of Shawn Currier. Currier entered the shed to render assistance to his partner immediately after Kim Weitzel was overcome.

"We are doing additional research and tests to determine what caused the oxygen-depleted air to be in the shed," Hermann said.

The chief inspector of mines has determined that the accident was caused by the accumulation of oxygen-deprived atmosphere in the sampling shed. This air mixture was transported through a drainage pipe feeding into the shed from the covered ditch surrounding the toe of the dump. The ditch was designed to direct water flowing through the dump into a collection system for treatment.

Research and modelling as to why the shed had an oxygen-depleted atmosphere will be conducted, including simulating the conditions (including temperature and atmospheric conditions) present during the incident in the sampling shed in May 2006. Results will be released in Fall 2007.



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.

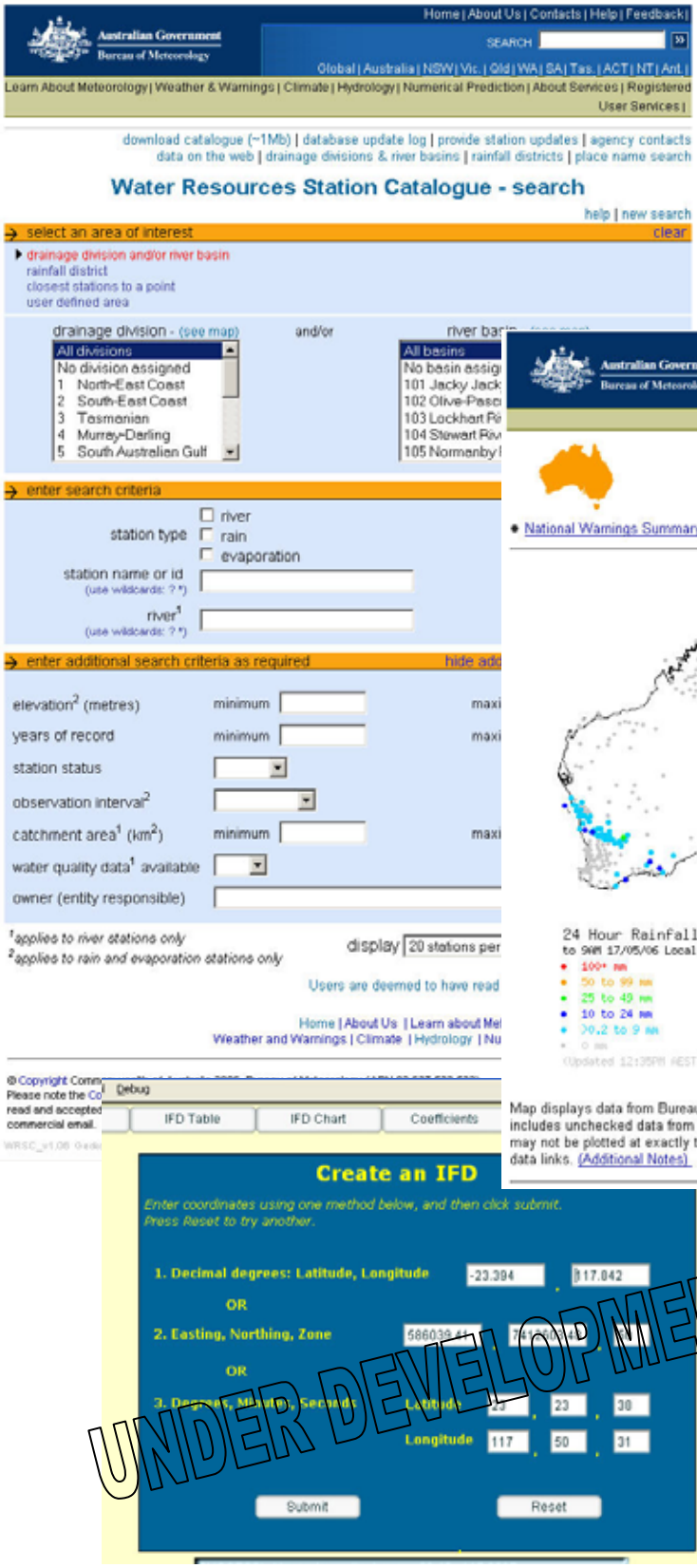
CONDITIONS

- 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.

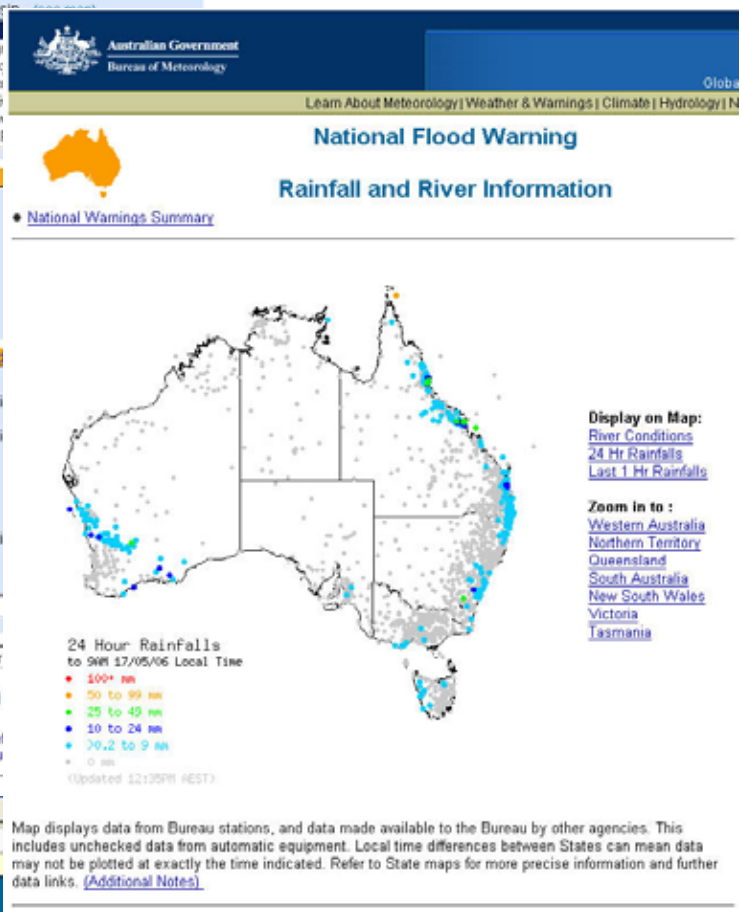
Further information and application forms can be found on the Associations website at ***www.aha.net.au***

BUREAU OF METEOROLOGY RESOURCES ON THE WEB

www.bom.gov.au/hydro/wrsc



www.bom.gov.au/hydro/flood



Membership Renewals

Membership renewal reminders will be distributed later this financial year, 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!

It's 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'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.

Pencilling in for your diaries 2007

- KISTERS User group meeting approx August 2007 Details available shortly
- AHA AGM August 2007**.**

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

Abstract

In agreement with the Lake Eyre Basin Ministerial Forum three gauging stations in Far Western Central Queensland were re-instated in May/June of 2005. These stations were Burke River @ Boulia (001202A), Georgina River @ Roxborough Downs (001203A) and Diamantina River @ Diamantina Lakes (002104A). In accordance with the LEB Intergovernmental Agreement objectives a high wet season priority has placed on obtaining high flow measurements at these sites. A flood gauging trip to this region occurred in mid March 2006. While the flood gauging trip did not achieve it's primary goal of measuring the estimated 1200 m^3s^{-1} at 002104A due to severe access issues, valuable measurements at 001202A and 001203A in the ranges of 0.6-15.5 m^3s^{-1} and 12-73 m^3s^{-1} respectively where obtained. This report discusses these measurements along with their implications for the pre-1988 rating curves. These included the probable requirement for an entire re-rate at 001202A due to an apparent change in river morphology. The rating at 001203A has also been modified slightly after it's largest ever measurement. Observations about operational issues that faced the flood gauging party, especially those that differentiate these sites to other sites under Central West Water Monitoring Group control, are also listed and discussed so that future flood gauging trips to this area may be better prepared.

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 first of a two part series 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

1. Introduction

In accordance with the Lake Eyre Basin Ministerial Forum three gauging stations in Far Western Central Queensland were re-instated in May/June of 2005. These stations were Burke River @ Boulia (001202A), Georgina River @ Roxborough Downs (001203A) and Diamantina River @ Diamantina Lakes (002104A). The process involved in the re-instatements is detailed in "Reactivation of Gauging Stations in the Lake Eyre Basin" (Bezzina and Pegg, 2005). In accordance with the LEB Intergovernmental Agreement objectives a high wet season priority has been assigned, within Central West Water Monitoring Group (CWWM), to obtain high flow gauges to define the rating curves for these sites as well as others within the LEB. As can be seen in Table 1.1 many gauging station have a low percentage of gauged flow to estimated peak flow. These gauging stations, particularly 001203A and 002104A, along with other stations in the Lake Eyre Basin (LEB), such as Barcoo River @ Retreat (003301B) present the CWWM with unique challenges for high flow gauging. These challenges arise mainly from the relative remoteness of the sites and difficulties of access during flood events and after local rainfall. The area these gauging stations are situated in is informally know as channel country and the rivers are morphologically similar, characterised by anastomosing channel patterns that exist over large floodplains along which slopes rarely exceed 0.0002m m^-1 (Nanson et al., 1988). The aim of this report is to document the first flood gauging trip to these stations since reinstatement during March 2006, report the results of the measurements and their implications for rating at the sites. The report will also document problems/difficulties encountered and where possible suggest possible solutions so that they can be taken into account for the next set of flood gauging trips to the region.

Table 1.1- Central West's Gauging Stations in the LEB (Adapted from SKM, 2005)

Station (1)	Max gauged stage (m) (2)	Max gauged discharge (m3/s) (3)	Max recorded stage (m) (4)	Max recorded discharge (m^3/s) (5)	Percentage ratio of max gauged to max estimated discharge (6) = (3)/(5) %
001202A - Burke River at Boulia	4.07	714	5.96	2885.5	24.7
001203A - Georgina River at Roxborough Downs	2.32	2.33	9.93	3832.4	0.1
0021 04A - Diamantina River at Diamantina Lakes	2.54	39.1	7.71	6714.4	0.6
003303A - Barcoo River at Blackall	4.06	60.1	8.24	1710.8	3.5
003202A - Thomson River at Longreach	6.25	7132	6.95	11695.2	61.0
003203A - Thomson River at Stonehenge	7.02	7828	8.20	16104.0	48.6
003204A - Cornish Creek at Bowen Downs	4.32	121	6.26	4621.2	2.6
003205A - Darr River at Darr	3.88	64.6	6.10	696.2	9.3
003301 B - Barcoo River at Retreat	3.87	192	11.47	3239.9	5.9
003302A - Alice River at Barcaldine	5.99	101	8.77	753.8	13.4

Events Prior to Trip

Rainfall across the Western Queensland in the week 07/03/2006-13/03/2006 was widespread, as shown by Figure 1.1. Rainfall in the vicinity of Winton caused significant rise in the Western River a major tributary to the Diamantina River, this can be seen in Figure 1.2. On the 9th and the 10th of March, rainfall events, in excess of 50mm lead to an almost immediate rise at 002104A, as shown in Figure 1.3. The Bureau of Meteorology (BOM) (2006) suggest that if 75mm of rainfall occurs in 24 hours over isolated areas, with lesser rains of 50mm over more extensive areas, stream rises and the possibility of minor flooding within the Diamantina catchment are probable. If lesser rainfalls have been recorded in the previous 24 to 72 hrs, then moderate to major flooding may develop. As can be seen in Figure 1.4, which shows rainfall figures for properties within close proximity of 002104A, local rainfall was in the vicinity suggested by the BOM to cause minor flooding. The rise in the hydrograph at 002104A triggered trip preparations on Monday the 13/03/06. The primary purpose of the flood gauging trip was to measure flow at 002104A.

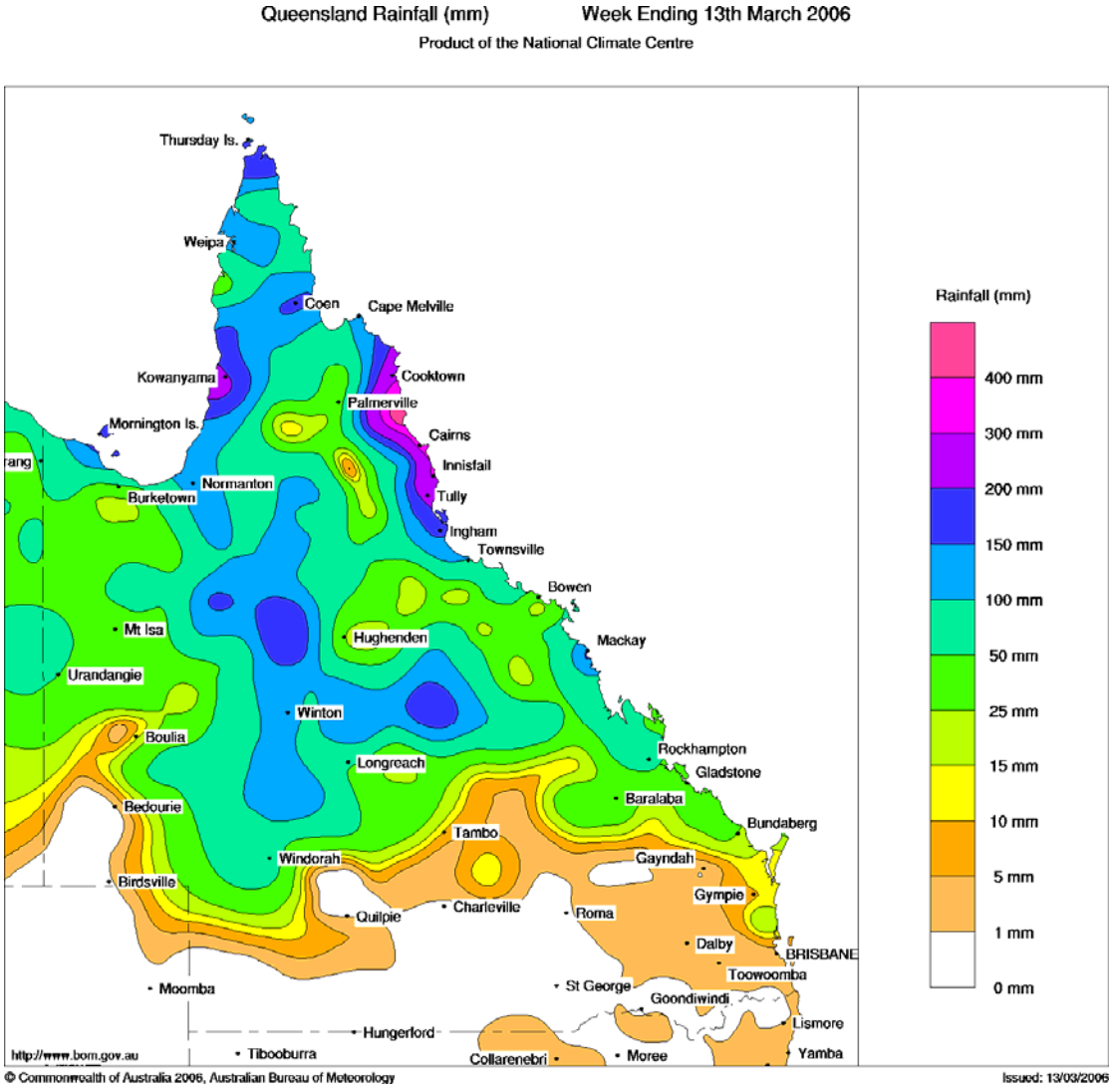


Figure 1.1- Queensland Rainfall map for week ending 13/3/2006

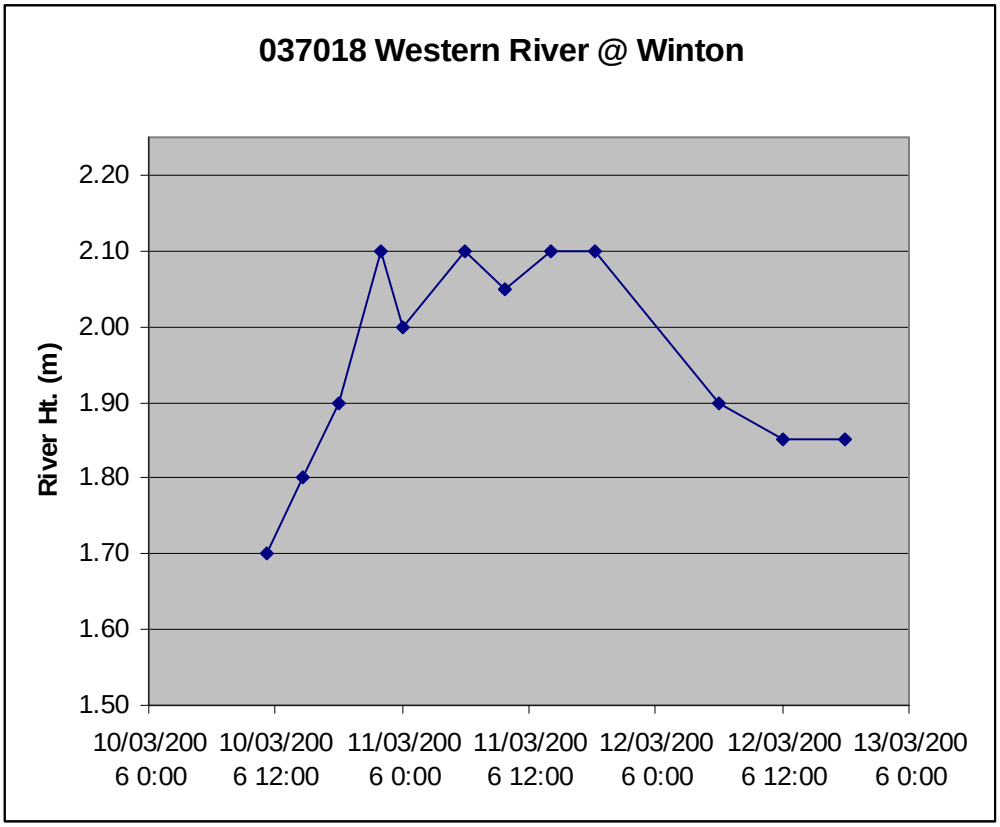


Figure 1.2- Flood gauge readings for Western R. @ Winton

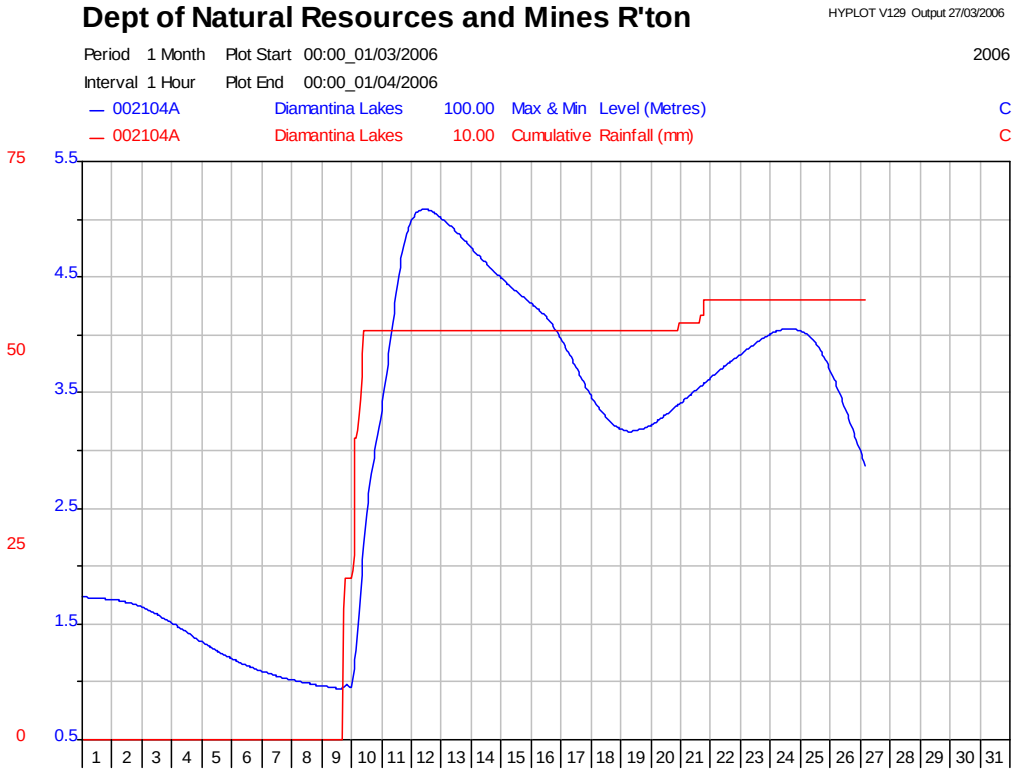


Figure 1.3- River Height and Rainfall @ 002104A for early March 2006-04-24

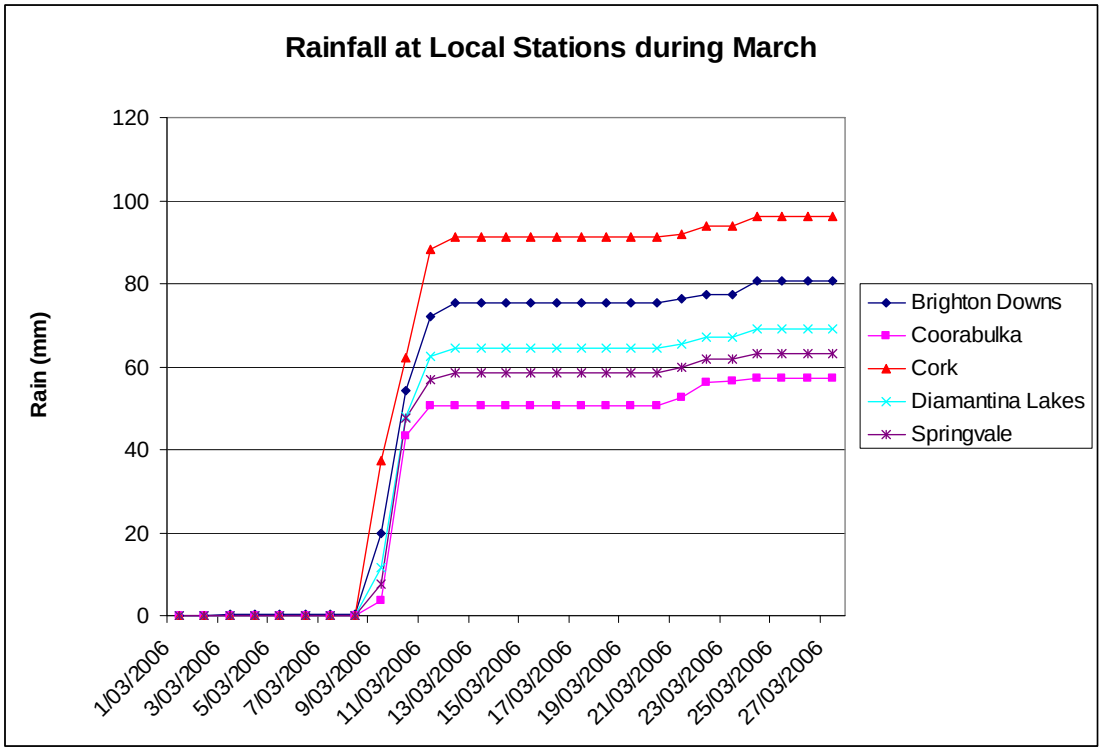


Figure 1.4- Rainfall at station in close proximity to 002104A for early March 2006

2. Methods

Equipment

The following equipment was taken from CWWM Rockhampton's depot

- Toyota 79 series Land Cruiser Ute with canopy
- Rio Grande 1200Hz ACDP
- Garmin 76S GPS
- Garmin Fishfinder 250 Depth Sounder
- Epirb
- WTW DO Meter
- WTW EC Meter
- WTW pH Meter
- Sat Phone
- CDMA phone
- Camping gear including gas stove
- 15Hp outboard motor and fuel tank
- Water sample bottles
- Pentax Optio WP Digital Camera
- Various spares
- 90 L Water
- Engel 12v fridge
- 2 Laptops
- USB drives
- USB interface power supply box
- USB drivers
- Food -7 days supply
- Generator
- Tools and star pickets
- Camel packs
- Current meters
- Gauging field sheets
- Esky
- 1 spare tyre
- Fluke process meter
- Various cable ties, screws, nuts and bolts
- Maps including 250k maps on Ozi explorer
- PPE
- Vehicle recovery equipment
- Survey equipment
- MHI servicing kit

The following equipment was located at Boulia Shire Council Depot and was required to be picked up before flood gauging could begin

- 12ft punt
- 80 L of fuel
- 4L 2 stroke oil
- Boat safety equipment

Itinerary

No formal trip itinerary was submitted before the trip commenced, a series of call-ins was set up with Longreach office and Rockhampton office to keep track of where we were and our direction of travel.

Measurement Methods

The methods for the stream flow and survey measurements are detailed in the relevant Hydrographic procedures:

- HYDROGRAPHIC PROCEDURE NO.2-DISCHARGE MEASUREMENT By CURRENT METER (Ezzy,1974)
- HYDROGRAPHIC PROCEDURE-DOPPLER CURRENT METER (White *et al*, 2003)
- HYDROGRAPHIC PROCEDURE NO.3 SURVEYING (Kelly, 1986)

The only deviations from these procedures were that the Doppler measurements were supplemented with GPS data and depth sounder data.

3. Results and Observations

Trip Itinerary

No trip itinerary was ever created. A trip log can be found in Appendix 1.

Access to Diamantina Lakes 002104A

Two attempts at access to 002104A from Boulia were made with neither being successful. Figure 3.1 and 3.2 show waypoints marking the positions where progress was halted. Figure 3.3 shows an approximately 1m high wet silt bank at a creek crossing which prevent further travel on the 21-03-2006. Phone numbers of local stations were obtained from the Min Min Encounter in Boulia so access conditions could be obtained from property managers in the area in future.

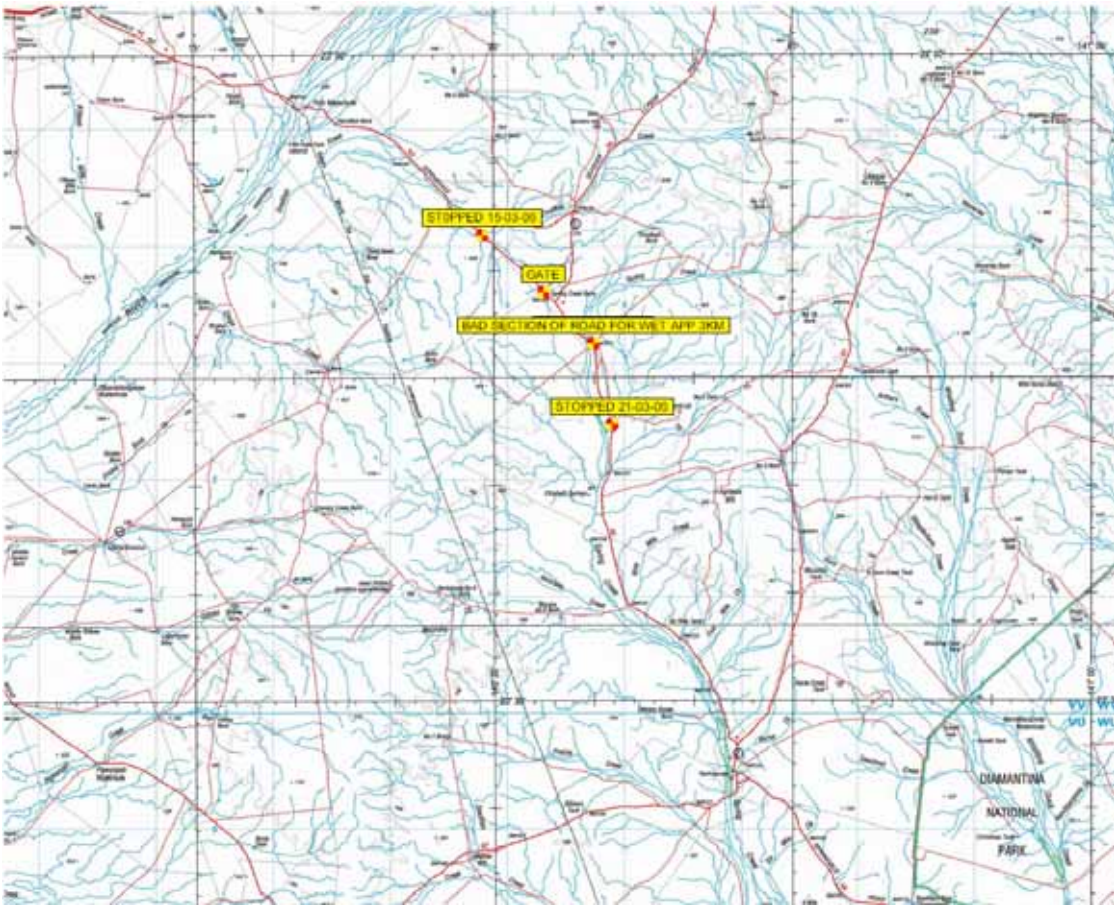


Figure 3.2 Satellite Imagery of area surrounding 002104A. Approximately 70km from where we stopped on the 21/03/06 to 002104A as the crow flies.

Figure 3.3- Approximately 1m high silt bank across road south of 'Warra'

Flow Measurements

Flow measurements were obtained at both 001202A and 001203A. 9 Doppler gaugings were obtained at 001203A ranging from >70 cumecs to <13 cumecs. The details of the gaugings can be seen in Table 3.1. At 001202A, 5 current meter gaugings were obtained between 0.7 cumecs and 15.3 cumecs the details of these gaugings can be seen in Table 3.2. Figure 3.4 shows the location of 001202A with the 'Main Channel and Sandy Channels' marked. Figures 3.5 and 3.6 display the timing of the gaugings in relation to the hydrographs for 001203A and 001202A respectively. All measurements except the first at 001203A were taken on the falling stage. A CTF for the 'Main Channel' at 001202A was recorded as 1.520m.

Table 3.1- 001203A Doppler measurement details

Measurement	Date	**Mean Gauge (m)**	**mean Q processed (cumecs)**	Comments
1	16/03/2006	**4.075**	**69.86**	Rising Stage
2	17/03/2006	**4.098**	**71.229**	
3	17/03/2006	**4.093**	**65.138**	
4	18/03/2006	**3.562**	**37.306**	Poor section
5	18/03/2006	**3.517**	**33.389**	
6	19/03/2006	**3.275**	**21.518**	Velocity may have been to slow at this section
8	19/03/2006	**3.190**	**19.16**	
9	19/03/2006	**3.133**	**17.916**	
10	20/03/2006	**2.981**	**12.709**	

Table 3.2- 001202A Current meter measurement details

Time_ Date	**Mean Gauge (m)**	**Q (cumecs)**	**% in Main channel**	**% in Sandy Channel**
18:06_15/03/2006	**1.882**	**15.223**	27.84	72.16
07:02_16/03/2006	**1.839**	**10.295**	26.66	73.34
16:35_17/03/2006	**1.772**	**3.857**	23.62	76.38
08:03_18/03/2006	**1.741**	**2.652**	23.61	76.39
15:18_20/03/2006	**1.670**	**0.714**	8.24	91.76

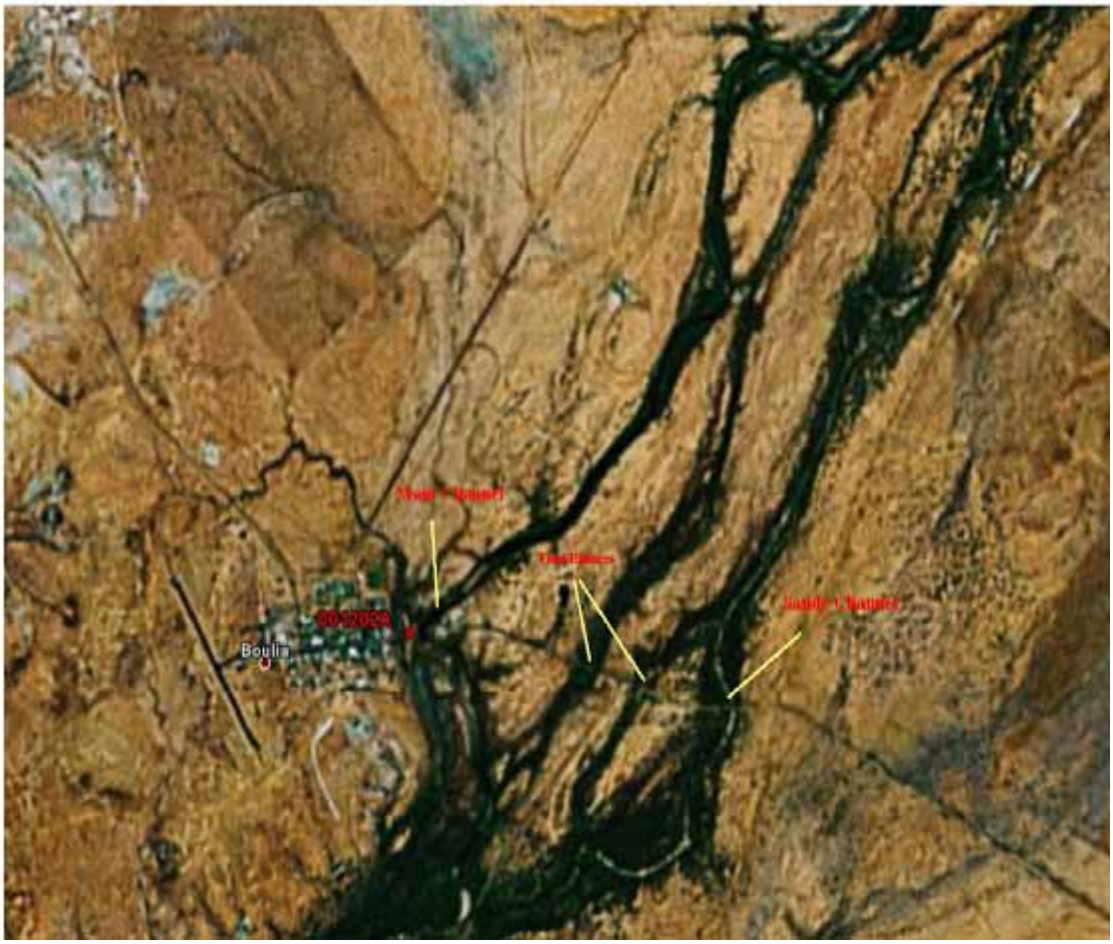


Figure 3.4 Location of Main and Sandy Channels in relation to town and 001202A

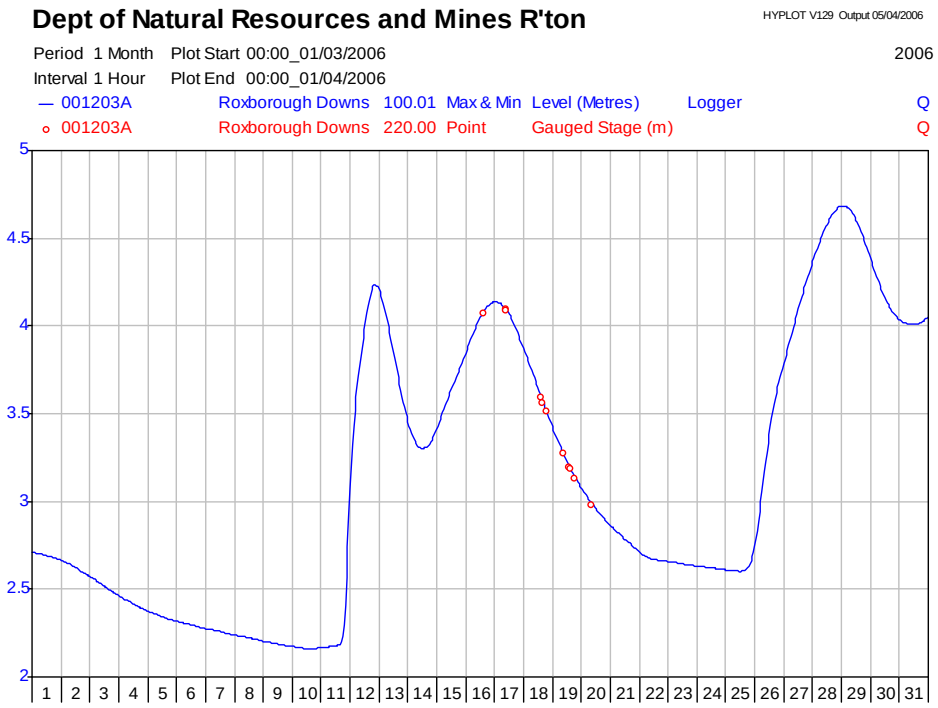
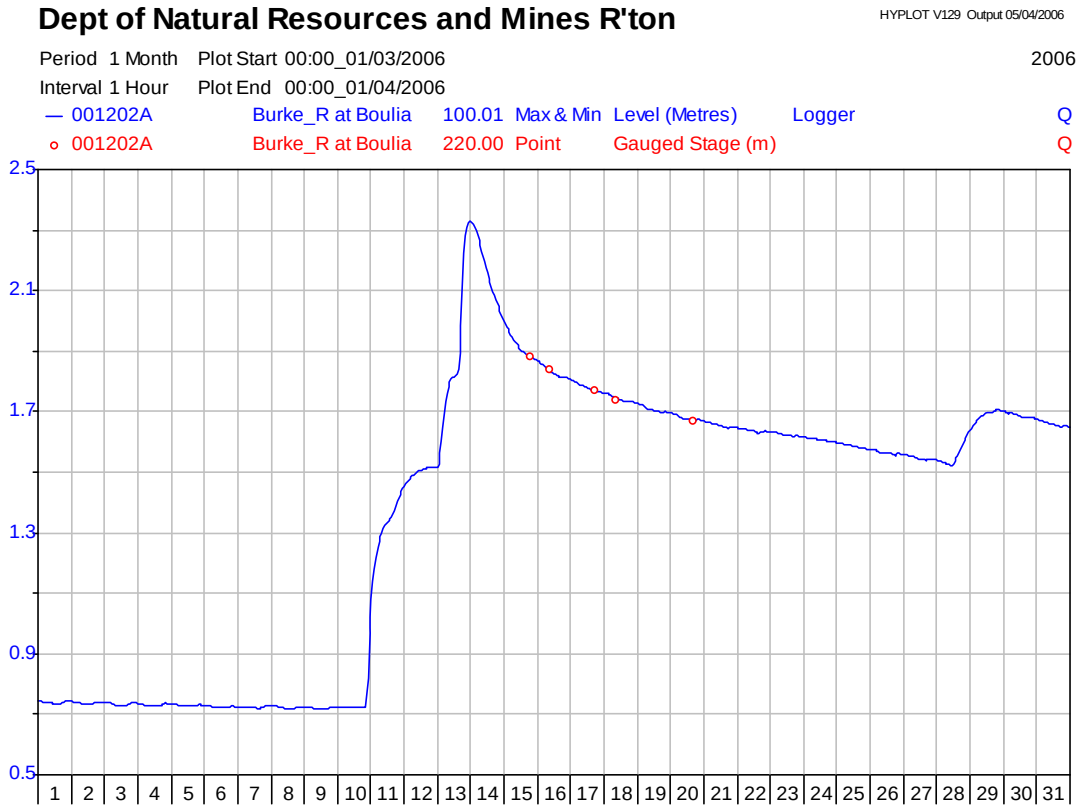


Figure 3.5 Position of Gaugings on Hydrograph for 001203A



The second part of this paper will appear next issue where Paul will consider the data and its implications on Ratings and how such long trips can be planned to improve efficiencies and overcoming problems encountered.

DEPARTMENT OF NATURAL RESOURCES, New South Wales.

Natural Resource Officer (Hydrometrics)

Job Classification MPO General Scale/Grade 1

Location Sydney Western Suburbs, Parramatta/Bega

Employment Status Permanent Full-Time

Vacancy Ref Job Reference No NR2007/038

Closing Date Friday, 16 March 2007

Total remuneration package to: $68,786.00 ($41,099.00-$62,334.00)

Collection and management of surface water, ground water and other associated hydrometric data. Assist in supporting NRM strategies, including water sharing plans, monitoring and compliance programs.

Selection Criteria

- Higher School Certificate (or equivalent) with a pass in 2 unit Mathematics and be eligible to undertake appropriate tertiary competency based training.
- Capacity to collect, interpret, archive and disseminate hydrometric field data.
- Ability to follow procedures and work carefully and accurately with numerical data including the capacity to implement quality assurance programs and procedures.
- Good written and oral communication skills.
- Ability to swim (documentary evidence will be required), row a boat, working at heights and occasional heavy lifting and to work safely outdoors and in isolated areas.
- Basic computer skills. Good problem solving skills.
- Mechanical, electrical or electronics aptitude. Ability to work independently and in teams and, to prioritise and plan activities.
- Awareness of natural resource management issues and environmental processes. Current drivers licence.
- Knowledge and understanding of Equal Employment Opportunity (EEO)
- Knowledge and understanding of Ethical Practice
- Knowledge and understanding of Ethnic Affairs Priorities Statement (EAPS)
- Knowledge and understanding of Occupational Health and Safety (OHS)

Notes: This vacancy will be filled at Parramatta only. However an eligibility list may be created to fill possible vacancies at Parramatta and Bega.

Inquiries
Paul Corbett
(02) 6491 8216

Information Package go to web link :
https://jobs.nsw.gov.au/JobDetails.asp?JobAdvertId=57651

Applications to

Recruitment Services PO Box 3720 Parramatta NSW 2124