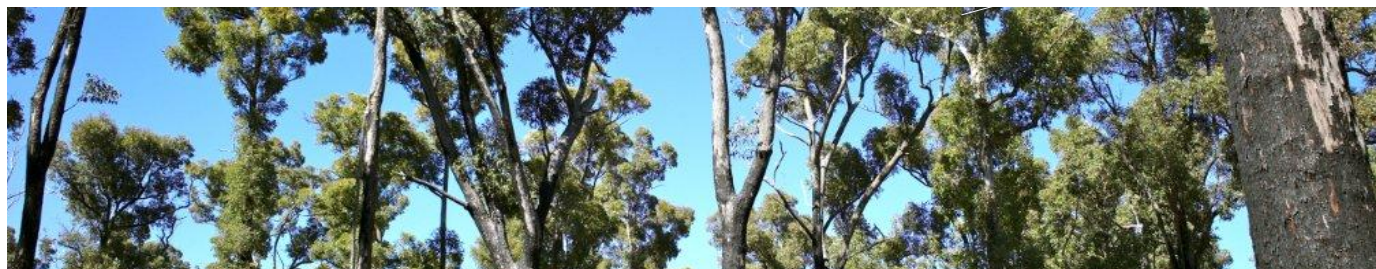


Wungong

Whispers



Volume 11 – November 2010



Trial adapts for 2011 to 2014

In the last issue of Whispers we reported that the Wungong Team was busy working with the DEC preparing a modified trial to be endorsed by the Conservation Commission.

A report detailing the modifications was prepared following the Board of the Water Corporation's review. Copies of the report have been prepared for the Conservation Commission.

Project director Chris Botica and project manager Michael Loh discussed the modifications to the trial with members of the Conservation Commission at their recent October meeting.

"We have incorporated recommendations based on the latest results from the Trial's research projects and catchment modelling," Chris explained.

The recommendations are detailed in a revised operation's program proposed for the next four years.

Chris stated that while the original 2005 Trial calculated an annual streamflow increase of 4-6 GL based on the research and rainfall records then available, the extent to which the forest is out of balance coupled with even less rainfall could not have been anticipated.

"Current measurements and hydrologic modelling indicate that under today's conditions if we continue with the original prescriptions the outcome may be as little as half of what was anticipated," he continued.

Chris added that thinning operations previously planned in Treatment areas 2, 3 and 5, other than the Cobiac, will no longer be undertaken.

The results of a more intense thinning over a smaller target area will be compared to and assessed against the Trial's original prescription.

In addition, previous research work will continue with added monitoring and ongoing evaluation.

The Wungong working group believes the continuation of the Trial under the revised arrangements is of paramount research importance to Western Australia.

Debate and informed discussions on the current status in our northern jarrah forest will be on the agenda at the Trial's annual Research Forum to be held this month.

Wungong Whispers will include a summary of the discussions and forum presentations at www.watercorporation.com.au/wungong

2010 AWA water award finalist

The Wungong Catchment Trial was one of the finalists under the Water Resource Management category in this year's Australian Water Association (AWA) WA Water Awards.

The WA Water Awards are held each year to promote the outstanding work achieved by individuals and organisations in the water sector. These prestigious awards, presented by the Department of Water and the Water Corporation recognise innovation and excellence in the conservation, management and delivery of water. The recognition came at an ideal time during National Water Week.



Graeme Hughes, Michael Loh and Chris Botica accept AWA finalist award.

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Aquatic fauna and climate change

The lack of rainfall over the last few years is changing streams that once flowed perennially. As a result, the biodiversity of Wungong's aquatic fauna is changing. The Aquatic Research Laboratory (ARL) of UWA has been monitoring stream invertebrates and fish for the Wungong Catchment Trial since 2005.

The study anticipates the aim of the Water Corporation to increase stream flow in the catchment will help alleviate the effects of climate change by conserving and improving stream fauna biodiversity.

Susan Creagh and Andrew Storey, who are conducting the research, report that the declining rainfall has seen perennial streams stop flowing over the summer months.

Temporary streams are less bio-diverse with fauna adapted to avoid extreme dry conditions. Fauna of perennial streams however, require permanent flows and can take longer to complete their life cycles.

This means perennial stream fauna could be threatened if the majority of streams in the jarrah forest were to dry. Findings to date show, that there have been no obvious changes in distribution or abundance of native fish and crayfish in the catchment.

Many large aquatic invertebrates (macroinvertebrates), in particular insects such as dragonfly larvae and diving beetles, are also considered tolerant of a wide range of environmental conditions, and encountered frequently in both seasonal and perennial streams. Insects make up about 80 per cent of the stream fauna observed at Wungong.

Less flow, less diversity

However in spring 2007, the richness and abundance of other macroinvertebrates, such as black flies and baetid mayflies significantly decreased across all treated and control sites. Increased temperature and decreased flow may be the reason for this; as these factors are known to play a role in hatching, larval development and adult emergence.

Varied recovery from this decline occurred in 2008 and 2009, but species richness and abundance continued to drop at Vardi Road, albeit to a lesser degree than was observed in 2007. In the summer of 2007, Vardi Road stopped flowing for the first time on record and this was seen as the most likely explanation for the greater decline at this site.

Based on historic conditions, macroinvertebrates of previously perennial streams are already changing toward a fauna more



Wungong Brook, March 2010. An example of the effect climate change has on water levels. For 93 years this stream was recorded to flow all year round but since 2005 it has been dry for several months each year.



Collecting macroinvertebrates



Sampling water quality



Collecting fish and crayfish

typical of temporary streams. Species that are becoming more common include seed shrimps and water mites which are associated with slower flowing seasonal streams. Other species, such as stoneflies and leptophlebiid mayflies, appear better able to cope with the changes through their ability to alter their rate of development (e.g. rate of egg hatching, larval development etc) dependent on environmental conditions.

What Groundwater fauna can tell us

Noteworthy was the presence of paramelitid amphipods at most sites. These amphipods are obligate groundwater (stygo fauna) species. Their presence suggests ground and surface waters intersect at these sites. The conservation significance of these creatures is difficult to determine owing to limited information on their biology and distribution.

However, between 2005 and 2009 there has been a trend toward declining abundance of these amphipods at both control and treated sites in the Wungong catchment, yet a slight increase at 31 Mile Brook in the Canning catchment. Change in their abundance may reflect that connections between ground and surface waters are decreasing in frequency and/or duration.

Wungong Trial results so far

To date monitoring has shown no adverse effects of the Wungong catchment trial on aquatic fauna biodiversity. It is difficult to define what effect the trial has had on offsetting the effects of further declines in rainfall.

The low annual rainfall in 2006, coupled with a particularly dry winter in 2007, seems to have adversely affected many creeks by reducing flow duration and is likely to be altering the life history patterns of aquatic macroinvertebrates.

Is this GREEN? A new way of estimating plant cover

Craig Macfarlane and Gary Ogden from CSIRO have developed a fast and reliable method for estimating the green cover of forest understorey plants.

The cover of vegetation is an important factor when assessing the forest's interaction between climate and water balance; making this development crucial to improving forest and water management.

The new method estimates green cover automatically by processing and analysing "colour nadir". That is, direct downward digital photographs of forest understorey based on chromaticity.



Gary Ogden taking a nadir image of understorey, using a bubble level pole. Camera is operated with an infrared remote control.

Before this, the fastest way to estimate understorey cover and leaf area was by visual assessment. This method was visually bias, with inconsistency between observers and observation periods.

Observers were also unable to distinguish between cover intervals smaller than 10 per cent. The result was poor accuracy and poor repeatability of cover estimates. Errors of 20-30 per cent were common.

Further challenges were posed with the old method in that forest understorey, is larger and taller than typically found in agriculture and rangelands. Observers had to view vegetation side-on rather than from above, making estimates of 'vertical' cover difficult.

The new rapid and objective method decreases room for human error and makes life easier for the observer. It is based around a combination of consumer-grade CMOS or CCD-based camera equipment.

CCD lenses, produce high quality images whilst the cost-effective CMOS technology allows direct access to understorey plant images without dealing with unwanted data such as shadows and ground litter.

To aid in estimates for understorey 'vertical' cover, the camera is



Original nadir image of forest understorey. Litter, wood and shadows make it difficult to calculate green plant coverage.



New method CMOS image. Litter, wood and shadows are erased making it easier to estimate coverage. Green foliage is black and background is white.

positioned high above the ground so a large area can be photographed.

This method is promising and adds value to quality data collection. However, no single analytical method is optimal in all cases, and it is still recommended the results from automated analyses are checked against the original digital images.

Workshop fills gaps in jarrah forest research

A two-day workshop hosted by the Department of Water in June provided information and stimulated debate on vegetation management and the

impact of climate change in the northern Jarrah forest of Western Australia. Participants included skilled research professionals from universities, industry

and government. After reviewing past and current research their task was to identify research gaps and set future research priorities.



Geoff Stoneman and Joe Kinal from DEC address the workshop participants during a tour of the jarrah forest

Two of the important questions raised were: "How are stream zones likely to survive the decline in groundwater?," and "What will be the outcome for ecosystems from continued change – will they crash or will they transition?"

The event began with a one-day scene setting tour of three key research sites in Jarrahdale, Dwellingup and at Alcoa's Huntley minesite.

Firstly, Water Corporation consultants Frank Batini and Keith Barrett hosted a tour of the Wungong catchment Trial's

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thinning demonstration sites near Jarrahdale. Then CSIRO's Dr Richard Silberstein described the results of forest management trials on stream flow in the 31-Mile Brook catchment.

The tour then travelled to the Hansen Catchment and Banksiadale Dam near Dwellingup where Andrew Grigg, Justin Hughes and Carl Grant from Alcoa discussed management of the forest for water production.

Dr Geoff Stoneman and Joe Kinal from DEC provided the final presentation for the day. They discussed the groundwater responses over a 25-year period to heavy vegetation thinning in the Yarragil 4C catchment.

During the second day about 35 participants work shopped past and current research on hydrological processes in the Jarrah forest. Using this information the group identified critical gaps in collective knowledge in respect to climate change and forest management and how they impact the hydrology of the Jarrah forest.

Emphasis was placed on the need to review available data in light of clearly defined objectives favouring the jarrah forest water supply. And to use these objectives as the basis for long term collaborated research.

The workshop was voted a success by all participants and it was agreed that the outcomes could be used by agencies and organisations to guide future priorities for research, business planning and funding applications.

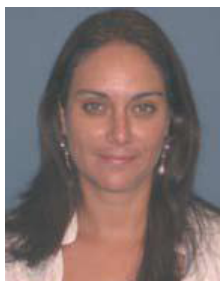
A report detailing the priorities identified by the workshop has also been produced for these purposes.



TEAM UPDATE

Bon Voyage to Paola

Paola has accepted a challenging job on the other side of the nation. She will be greatly missed and we wish her all the best in her new endeavours.



In Paola's place

Rima Itani is our newest member in community engagement and research coordination. After spending a year dedicated to education and charity work in Morocco, Rima joins the Wungong team ready to put her background in Biotechnology and her passion for helping others into practice.



Calendar update

July 2010	Meeting with Conservation Commission
August 2010	Public Perceptions Survey presentation by Joanne Beckwith
September 2010	Submission of trial modification to Conservation Commission Presentation by Customer Advisory Council
October 2010	AWA Water Award Winner is Announced Australian Hydrographers Association Technical field day NRM site tour
November 2010	Global Warming Research Forum, City West UWA Student field trip

Contact details

This newsletter is produced by the Water Corporation and is also available electronically at www.watercorporation.com.au/wungong. To subscribe or unsubscribe to this newsletter, please contact Rima Itani, Community Engagement Officer on **9420 2950** or email Rima.Itani@watercorporation.com.au
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