

Milestone gathers project momentum

The Conservation Commission began a formal audit of the implementation of the Wungong Catchment Trial during August. The review is part of the 4-yearly process as recommended by the Environmental Protection Authority's 'informal' assessment recommendations.

"Members of the Water Corporation's Wungong Working Group are now preparing documentation to assist the assessment of preliminary activities," said Project Director Mr Chris Botica.

The initial review of operations that included satellite imagery, field inspections and personal interviews will be followed by an assessment of the procedures and systems set out in the Project's implementation plan.

Chris said that the Trial faced ongoing challenges including agency interaction, research coordination and the ever

increasing evidence of the impact of climate change in the Catchment.

"Our research projects are beginning to monitor beyond the baseline and initial results, particularly in aquatic fauna and hydrology are confirming the impact of our drying climate in these areas," said Chris.

We are also planning some new initiatives including the broadening of our Annual Forum which is to be held on 11 November, connecting scientific research under major categories and providing further stakeholder opportunities. These activities will increase agency and community involvement and further understanding of the Trial's objectives.

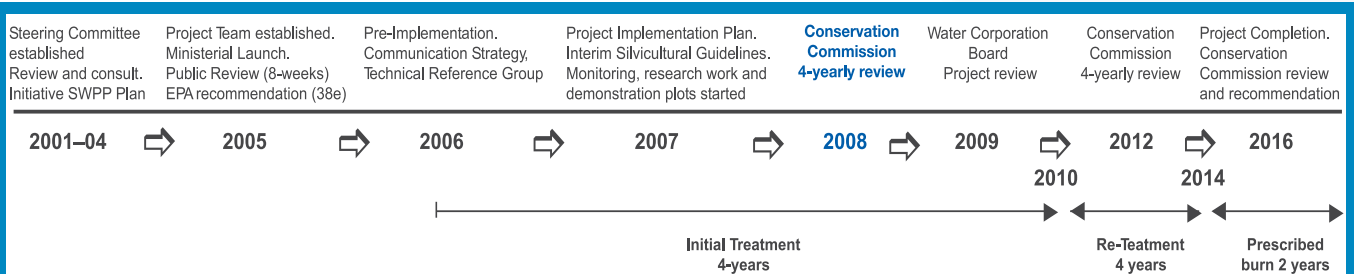
Final research reports will be made available on the Project's website at watercorporation.com.au/wungong



Chris Botica

Project Activities

| | |
|------------|---|
| 29 April | Community Forest Inspection |
| 5 May | UWA students tour* |
| 21 May | Technical Reference Group meeting |
| 26 May | Greens Party (Canning Bridge branch) |
| 30 May | Wungong Team visit Alcoa World Alumina site |
| 8 June | Institute of Foresters Australia tour |
| 14/15 June | Fungi Group field and workshop weekend |
| 18 August | Helena Catchment Group |
| 21 August | Apiarists & Beekeepers tour |
| 27 August | Curtin University NRM student tour |



Wungong Catchment Trial – timeline summary

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Aerial photography monitors changes in our catchments

By Andrew Malcolm and Mike Canci

Remote sensing is a term applied to data captured from space. Examples include Google Earth images, aerial photographs, thematic imagery, radar imagery and Landsat. These tools are very useful when a manager wishes to measure changes over large areas, such as forests, catchments and rangelands.

The Perth-based company SpecTerra specialises in this field. SpecTerra uses a specially constructed camera fitted to an aircraft flying in a pattern at 2,170 metres (m) above the forest. The camera records data in 0.5 m x 0.5 m parcels (pixels). There are 40,000 pixels taken over each hectare of land, giving a high degree of accuracy when making comparisons over time. The camera also records data in several 'bands' for example infra-red, red, green and blue. This enables other valuable information to be derived. Data are collected at the same time of the year to minimise extraneous differences.

Data was captured for the whole Wungong catchment in 2005, giving a starting baseline. For some sample areas, additional data was obtained in 2007, allowing for comparisons.

So far, these data have been used for three main purposes including as a research tool, in monitoring operations and forest health.

The photographs below show four of the demonstration plots near Jarrahdale road. These one hectare (100 m x 100 m) plots are in high quality jarrah forest that was logged commercially in summer 2006 to various silvicultural prescriptions. These prescriptions ranged from no change (control, treatment 7) to a more severe treatment where two-thirds of the smaller trees were removed (treatment 4). Several field plots were established within each of these larger plots. These allow comparisons between data collected by field sampling with data collected by SpecTerra.

The relationship (regression) between the two sets of data for crown cover is extremely good. The field data slightly overestimate the crown cover. Data from the photos show that the crown cover was reduced by the logging from 7000 m²/ha



or 70 percent cover (in treatment 7) to 2200 m²/ha (in treatment 4), a reduction in crown cover of 4800 m²/ha. Treatments 8 and 3 had a final crown cover of 2800 and 3900 m²/ha respectively.

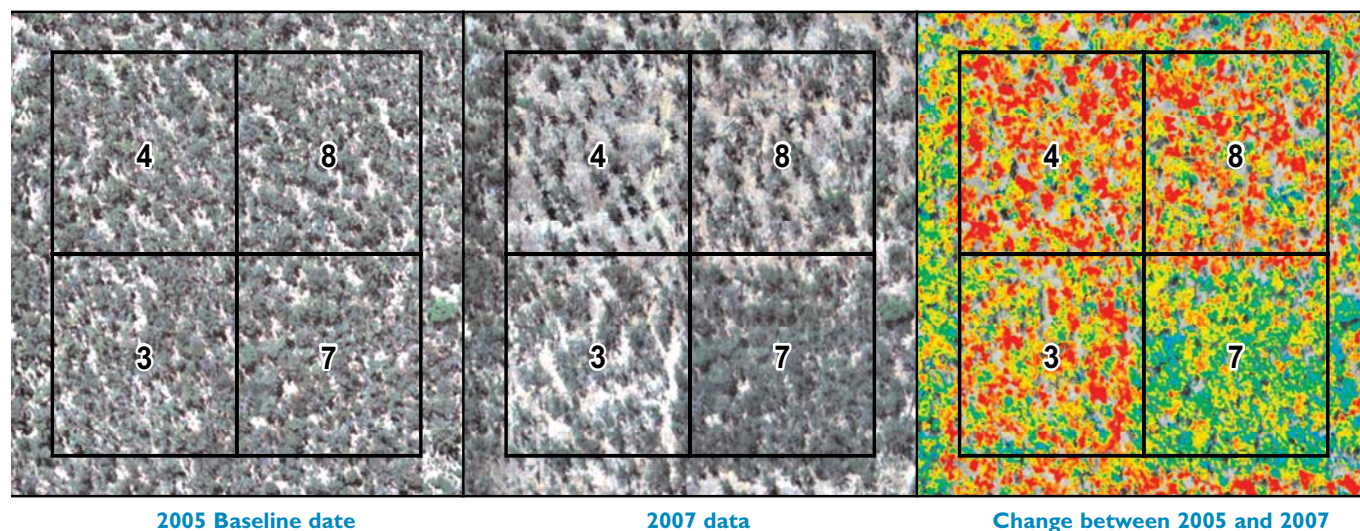
Hydrologists and plant physiologists should now be able to estimate the effects of these changes in crown cover (or leaf areas) on interception and transpiration from these treatments. With additional photos to be taken in 2008 and 2009 we will also be able to monitor the health of the remaining trees, the recovery of crowns and the rate of development of the understorey.

Monitoring Operations

Wherever operations are carried out over larger areas, managers need effective methods of monitoring their implementation. We have used SpecTerra data to monitor both the canopy change resulting from commercial logging operations as well as non-commercial operations.

Data show a change in crown canopy following the commercial logging from an average canopy of 6100 m²/ha to an average of 3700 m²/ha after the logging, a change of 2400 m² or 39 per cent. This value is quite close to the figure obtained from the

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Drought-stressed jarrah tree deaths at Blue Rocks, Jarrahdale in June 2007.

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equivalent in Treatment 3, where the reduction was 44 per cent.

Data for the non-commercial notching operations show a reduction in canopy

from 5100 m²/ha to 2900 m², a difference of 2200 m² or 43 per cent. A number of field plots were also established to monitor this operation. Field plots show that basal areas were reduced from 30 to 16 m²/ha, a reduction of 47 per cent. As it was the smaller trees that were preferentially targeted for notching, it could be expected that the reduction in crown cover may be less than this value.

Monitoring Forest health

The photos also allow us to view any changes in health in other parts of the forest. For example we have noted

where the vegetation is recovering 18 months after a prescribed burn, where crown are showing new growth as early as six months after thinning and where trees are dying from drought. The latter were observed near a number of rock sheets on the site. What is of concern however is the large size of the trees that are being affected. Admittedly the 2006 drought was severe, but some of the trees that are affected have grown on this site for over 100 years.

Are the long-term decreases in rainfall and the falling water tables finally starting to show effects on forest health?

Climate change and streamflow predictions

James Croton – Water and Environmental Consultants

The 31 Mile Brook catchment is close to Wungong catchment and is being considered for research into the effects of forest treatments. As part of the initial studies, we applied the WEC-C hydrological model to the catchment, matched it to existing streamflow data and did some simulations to predict possible streamflows under different vegetation scenarios. To create a rainfall record to use in the predictive studies we applied the 11 years of daily rainfall for 1996 to 2006 as a three-times repeating-series from 2007. In other words, the daily rainfall in the years 1996, 2007, 2018 and 2029 were assumed to be the same, the daily rainfall in the years 1997, 2008, 2019 and 2030 were assumed to be the same, and so on for the 11 years of historical record.

Figure 1 shows annual flows for the simulations from 1996 with the observed flows plotted up to 2006. Interestingly, the flows in every 11th year should be same as the rainfalls are the same, however, they aren't. This is due to two factors, firstly the vegetation is growing, and secondly the catchment is drying out due to the below-average rainfalls. The combination of these two factors has resulted in the simulated flows going from an average of 129 mm/yr in the period 1996 to 2006, to 52 mm/yr in the period 2029 to 2039, a 60% reduction! At the same time the vegetation was assumed to have increased in density after 2007 by only 0.5%/yr or 18% in total.

Figure 2 compares the no-treatment scenario presented in Figure 1 with simulated streamflows if the forest was intensively thinned in early 2009 from the original basal area of about 25 m²/ha to a basal area of about 9 m²/ha. The difference in streamflows, that is the increase due to treatment, averages 75 mm/yr (87%) for the period 2009 to 2017, 38 mm/yr (56%) for 2018 to 2028 and 16 mm/yr (31%) for 2029 to 2039. While such streamflow increases would be considered useful additions, they are modest compared with the intensity of the assumed treatment.

Editor's note:

In Figure 2 the simulated difference in streamflow of 75 mm/yr is shown to decrease over the next 30 years as a result of a single thinning. In a managed catchment, such as proposed by the Wungong Trial, it is expected that thinning would be repeated at intervals of about 15-20 years, therefore enabling higher streamflow to be maintained.

The streamflow increase in the Wungong Catchment Trial has been estimated at 50-75 mm/yr using a slightly higher basal area than in the above scenario.

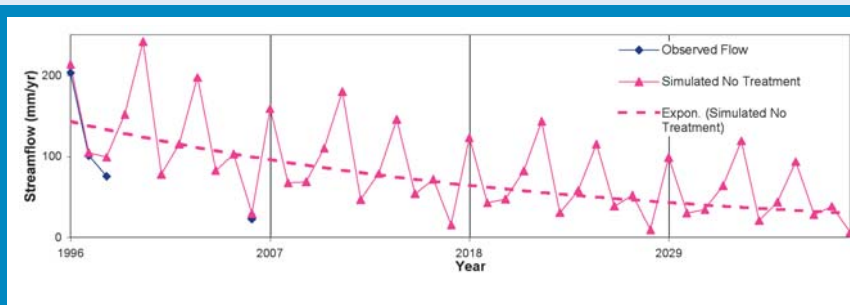


Figure 1: Simulated streamflows with a 0.5%/yr growth of vegetation density after 2006 and a rainfall series based on the 11 years from 1996 to 2006 repeated three times.

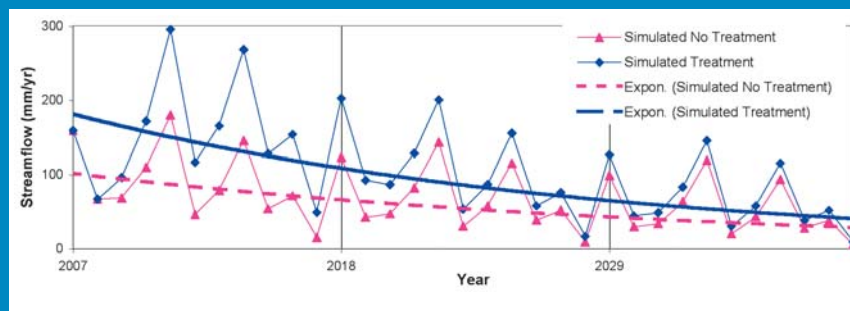


Figure 2: Simulated streamflows for a treatment to a basal area of about 9 m²/ha compared with the no-treatment, slow-growth scenario presented in Figure 1.

Students in the Catchment



Scientist Dave Kabay addresses students from UWA at fauna plots established in the Wungong Catchment as part of the Trial's research program.



Curtin University natural resource management students gain valuable knowledge during a recent tour of the Wungong Trial. Twenty-six students spent the afternoon tree marking and discussing streamflow yields with team members Frank Batini, Michael Loh, Richard Boykett and Margaret Wilke.

Project Update

Bishnu Devkota has recently been appointed to a new challenge in the Water Corporation's Water Efficiency Branch. Members of the Wungong Working Group wish Bishnu well in his new role and will assist in a smooth transition of responsibilities for the research monitoring program.

The Water Corporation is keen to assist students with projects in the Natural Resources fields of study and the Wungong Catchment Trial area has already proved useful to students from UWA, Murdoch and Curtin Universities.

Recently, 12 students from UWA's faculty for Agriculture and Natural Resources attended a lecture given by Dr Bishnu Devkota (Water Corporation) on the Wungong Catchment Trial. This was followed by a field visit to review the complex interactions between silviculture, fire management, the hydrologic cycle, forest health, water yield and measures of biodiversity.

These third year students will use some of the research sites established by consultants to the Water Corporation for their own research projects. Their work involves further studies of invertebrates, birds, vegetation, soil nutrients and infiltration/runoff processes. A field visit in May selected

three possible project sites that provide an appropriate range of treatments. This visit was led by former UWA graduates – Frank Batini BSc (For) 1963, MSc(Oxon) 1972 and David Kabay B Agric Sci (Hons) 1969, MSc (Biotech) 1993.

A big advantage for the students is that the pre-treatment, baseline data have already been collected by consultants. These data will now be provided to students and will allow for changes to be detected more readily.

Many of the 20 research and monitoring projects that support the Wungong Catchment Trial are associated with academic institutions and others specialising in natural resource management. These include the CSIRO, Hydrosmart, Mattiske Consulting Pty Ltd, Kabay Consulting Pty Ltd, Beckwith Environmental, SpecTerra, WA Naturalist Club, WA Museum and the Department of Environment and Conservation.

Apiarists tour



Frank Batini (forest consultant) provides expert guidance to Linda Manning (editor BeelInformed newsletter) in the use of the densiometer to measure basal area while George Howie, member of the Western Australian Apiarists Society observes.

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 Margaret Wilke, Communications Officer on **9420 3662** or email margaret.wilke@watercorporation.com.au. For all other enquiries please email wungong@watercorporation.com.au.



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