

*This is the fifth bulletin developed by the Wandoo Recovery Group (WRG) to provide information about the progress of research and the improvements in understanding of wandoo crown decline.*

## Background

Wandoo (*Eucalyptus wandoo*, Blakely) is a widespread and ecologically valuable tree species of south-western Australia. Endemic to the area, the species is important for wildlife, is a source of high-quality honey, yields first-class structural timber and plays an important role in watershed protection and amenity. Most of the eastern or high salinity risk areas of Perth's forested water supply catchments are dominated by wandoo.

Wandoo is under threat from the phenomenon of 'wandoo crown decline', which expresses itself in the decline of the tree canopy. In its earliest stage there is foliage death on terminal branches (flagging). Usually, affected trees produce epicormic branches that can help to rebuild the crown. But if the condition of the tree is poor, or the problem persists, these will also die. In some cases, the entire tree will eventually succumb.

Wandoo crown decline occurs on a regional scale across a range of climatic zones and landscapes and is a cause for significant concern. Although the cause is unclear, climate change, altered land use and management, and pest populations appear to be relevant factors.

The government's Wandoo Recovery Group (WRG) was formed in 2003 to investigate the causes of decline and develop appropriate strategies and actions. The WRG focuses on four priorities:

- research – to identify the causes of decline;
- mapping – to better understand the extent, frequency and severity of decline;
- communication – to be achieved through an ongoing public education program; and
- building partnerships with other organisations and community groups.

The Department of Environment and Conservation (DEC) provides technical and administrative support to the WRG.

*Right: Ryan Hooper installs monitoring equipment in wandoo in the Helena catchment. Photo – Liz Manning*

## Research

### Insects and fungal studies (phytopathological research)

Research by The University of Western Australia (UWA) PhD student Ryan Hooper has found that wood boring insects and fungal pathogens are constantly associated with branch death. A wood-boring insect (known as Type-1 borer) has been found to exist in higher populations in wandoo woodlands of declining health. The environmental factors driving population dynamics of Type-1 borer require further investigation. Monitoring phenology (development of bud formation, flowering and seed set) and growth in the wandoo forest is under way and will aid in this understanding.

### Environmental studies (Ecophysiological research)

Early research revealed important differences in the way wandoo handles drought conditions, compared to other eucalypts like jarrah and marri. While wandoo is able to continue to take up water from soil that is quite dry, it does so by developing enormous tensions in its sapwood. Such tensions can lead to failure of the tree's hydraulic system if soils dry out too much. UWA's Erik Veneklaas, Pieter Poot and visitor Fabiano Scarpa are investigating whether the tensions previously observed in the different species are likely to cause embolisms (air bubbles that render vessels useless for water transport) of the trees' vessels. Such embolisms would reduce the capacity of trees to supply the foliage with water, causing leaves to rapidly dry out.

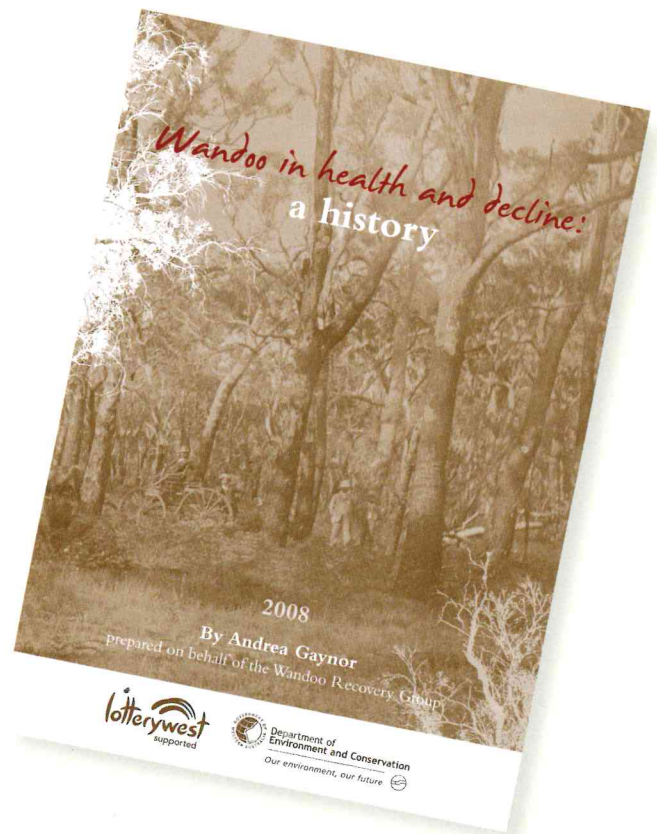


# Wandoo RECOVERY GROUP

## Historical review of wandoo

Dr Andrea Gaynor from UWA, has undertaken historical research to determine whether the current decline episode is historically unique or cyclical. She has identified possible causes and built a record of the past relationships between people and wandoo. The research involved interviews with people who have lived and worked in wandoo areas and includes photographic, archival and other documentary sources. Although the review sought evidence of crown decline anywhere in the range of wandoo, two focus areas were chosen for more detailed study: Kojonup and surrounds, and the areas north and east of Mundaring (including Julimar). While there's no unequivocal evidence of prior occurrence of wandoo crown decline, the testimony of many keen observers, together with the documentary record, strongly suggests that it has only emerged at a significant level since the 1980s.

The study unearthed fascinating insights into wandoo and its woodland settings, which may provide a useful context for further research. A booklet – *Wandoo in health and decline: a history* – has been produced that brings together the results of historical research (Gaynor, 2008).



(Left to right) DEC Director General Keiran McNamara, WWF-Australia Land Program Leader Richard McLellan, DEC Manager Swan Region and WRG Chairman Alan Sands, WRG Executive Officer Liz Manning, and former Environment Minister David Templeman at the Lotterywest grant presentation for the Woodland Recovery Project, Photo – R. Harris

## Surveying and mapping

To better understand when and where the decline occurs, WRG is coordinating a Woodland Recovery Project, assisted by DEC, WWF-Australia, and a \$71,295 Lotterywest grant. The two-year project includes an historical review of wandoo, community surveys to record and monitor wandoo health and an education campaign to promote knowledge relating to the conservation of woodland species with a focus on wandoo.

# Wandoo RECOVERY GROUP

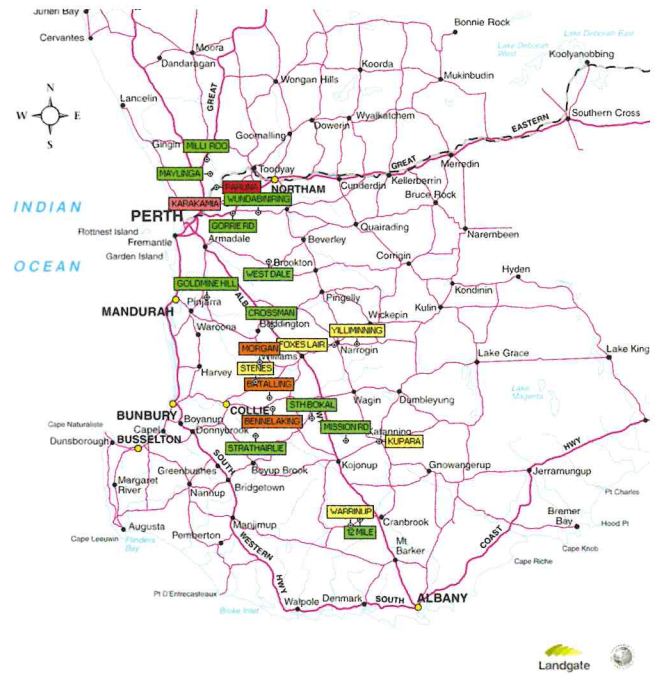
## Community surveys

Volunteers, local environment groups and TAFE colleges are helping the WRG record and monitor wandoo health at several sites across its range. The collaborative nature of the project unites research with community knowledge and is underpinned and strongly supported by DEC.

Crown assessment training workshops are conducted each year to instruct community volunteers on the survey technique and to help ensure a consistent standard in the results. Swan, Challenger and Great Southern TAFE have incorporated wandoo surveys in their Conservation and Land Management studies. Students and volunteers learn practical skills in on-ground monitoring and assessment.

Twenty-two monitoring sites have been established since 2006 on a range of land tenures. Results give information on stand structure (number and density of trees), extent of recent branch death and current crown health at each site.

During 2008, 70 transects were surveyed across 21 of the sites. Additional sites, spread across areas such as Cranbrook, Stirling Range National Park, North Dandalup and Collie have helped fill gaps in the mapping project, as identified in the WRG preliminary report *Baselining Wandoo Crown Condition*. Continued monitoring will improve understanding of decline and recovery cycles of wandoo crowns. Reports covering the results from the 2006 and 2007 surveys can be viewed on DEC's website ([www.dec.wa.gov.au](http://www.dec.wa.gov.au)).



Above: The location of wandoo crown condition survey sites across the south-west of Western Australia. Colours of the markers indicate the relative outlook for the trees at each site (green = good, red = poor) based on the amount of flagging observed.

Below: Swan TAFE students survey wandoo health at Wundabiniring Brook with DEC entomologist Allan Wills (far right). Photo – Liz Manning



## Review of wandoo decline across the Wheatbelt and State forest

In 2002, a survey of wandoo decline created a snapshot of wandoo health across three broad transects covering 600 kilometres, including 129 sites and spanning wandoo's east-west range (Mercer, 2003). The decline pattern was found to be broad-scale, variable and not continuous across the landscape. In 2008 a second survey was undertaken to build on the data, investigate factors thought to predispose wandoo trees to decline and establish trends in wandoo health over the intervening six years (Mercer, 2008). Results found that although wandoo decline continues to occur, recovery is evident at some sites. Recovery is most noticeable on the northern transect around York, becoming less so along the central and southern transects respectively.

This project was coordinated by the WRG and undertaken by private contractor Jack Mercer. The Avon Catchment Council, South West Catchments Council, South Coast NRM Inc, and DEC funded the project. Funding provided by the NRM councils was through the State and Federal governments' Natural Heritage Trust and the National Action Plan for Salinity and Water Quality Program. WWF-Australia assisted the WRG with the administration of funds provided by project partners. Support from these organisations extends the existing collaborative efforts between government and non-government organisations and raises appreciation of the importance of healthy woodlands.

## References

- Gaynor, A (2008). *Wandoo in health and decline: a history*. Prepared on behalf of the Wandoo Recovery Group, August 2008. Department of Environment and Conservation, Kensington, Western Australia.
- Mercer, J. (2003). *Survey of Eucalyptus wandoo decline*. A report on wandoo decline in the Western Australian Wheatbelt on behalf of the Department of Conservation and Land Management (CALM), Western Australia.
- Mercer, J. (2008). *Second survey of Eucalyptus wandoo decline - Final report June, 2008*. A report on wandoo decline on behalf of the Wandoo Recovery Group, Department of Environment and Conservation and WWF-Australia.

## Future directions

Tree decline has been recorded in a number of important woodland species such as wandoo and tuart. The newly approved Centre of Excellence for Climate Change, Woodland and Forest Health will do much to unite the research into these declines. Research activities are embodied in four programs:

- climate change, woodland and forest declines
- decline ecology
- restoring biodiversity values
- policies and action for woodland restoration.

In addition to five years of State Government funding, contributions from universities, many government, non-government organisations and community groups will enable a concerted effort in addressing the issues of woodland decline. A recent three-day field trip, hosted by the centre, toured State forest and woodlands between Helena Catchment, Dryandra, Collie and Busselton. The field trip combined site visits and workshops to familiarise researchers and forest managers, sponsors and other stakeholders with the nature and scale of the problem and align them to build strong and collaborative projects.



DEC's Nature Conservation Advisory Officer and WRG member Peter White discusses declines occurring at Dryandra Nature Reserve during the recent Centre of Excellence field trip. Photo – Liz Manning

## More information

Copies of reports and information about wandoo, WRG projects and research are available electronically from DEC's website at [www.dec.wa.gov.au](http://www.dec.wa.gov.au). For more information on the WRG or to join the mailing list, contact Executive Officer Liz Manning on 0427 441 482 or email [lizmanning@bigpond.com](mailto:lizmanning@bigpond.com).