Department of Environment and Conservation

Wandoo Recovery GROUP

Bulletin No. 4 **March 2007**

This bulletin is the fourth in a series developed by the Wandoo Recovery Group (WRG) to communicate information about wandoo crown decline, the progress of research, and the activities of the WRG.

Background

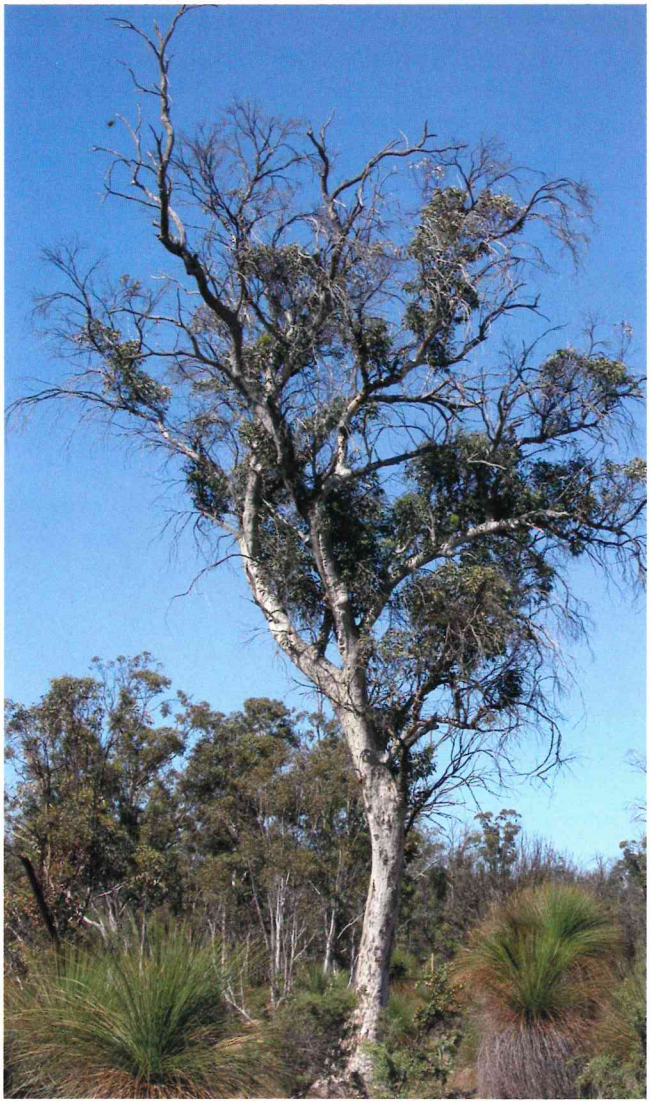
Wandoo (*Eucalyptus wandoo*) is a widespread and ecologically valuable tree species, endemic to the south-west of Western Australia. Wandoo woodlands provide important habitat for fauna, maintain catchment hydrological balance and groundwater stability and are recognised as places for recreation, enjoyment and visual beauty. Since the 1980s, wandoo has been under threat from the widespread phenomenon known as 'wandoo crown decline'. This crown decline appears to be due to a combination of interacting biotic and abiotic factors and has raised considerable concern about woodland ecosystem health.

Initial symptoms of crown decline are characterised by leaves on the terminal branches turning brown and starting to die off ('flagging'). Usually, affected trees produce epicormic shoots (new foliage), that sprout along the lower limbs. These epicormics may also die, resulting in progressive decline of the tree crown and sometimes death of the tree. However, in other instances epicormics will persist to rebuild the crown.

The Wandoo Recovery Group

WRG was formed in 2003 to investigate the causes of wandoo crown decline and coordinate the development of appropriate recovery strategies and actions. 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
- **collaborating and building partnerships** with other organisations and community groups.



Photos: A healthy wandoo (left) and one suffering decline (above). (Photos - P. Poot)

Research

WRG has prepared a research strategy that aims to increase the understanding of the relationships between climate, tree physiology and possible disease pests and pathogens that could be contributing to wandoo crown decline.

The University of Western Australia (UWA) is undertaking research and monitoring projects with support from the Department of Environment and Conservation (DEC). Current projects focus on two main areas:

- tree physiology and ecology – to determine whether drought or other environmental stress factors are the primary cause of poor wandoo health, and
- pathology – to determine whether insects and fungi are the agents responsible for the observed damage to wandoo crowns.

The Australian Research Council, DEC, the Cooperative Research Centre for Plant-based Management of Dryland Salinity and UWA provide funding for these projects.

Recent findings indicate:

- Wandoo crown decline occurs through most of the species range and is not explained by a single environmental factor.
- Wandoo trees continue to transpire when soils dry out, whereas co-occurring species such as jarrah and marri have been shown to reduce their transpiration rates.
- Tolerance levels to drought and salinity vary among wandoo populations from different locations.
- Wood boring insects and fungal pathogens of wandoo are consistently associated with branch death.
- Crown assessment surveys have shown the period from April to May to be the peak period for decline symptoms.

Future research will address links between environmental stress and susceptibility to pests and diseases. This hypothesis-driven research will be guided and supported by large-scale mapping and monitoring of decline, as well as by historical research (History Department, UWA).

Mapping canopy condition

DEC is assessing wandoo canopy condition at landscape scales using a process known as Landsat Trend Analysis. Sites within Helena catchment and Talbot Block, Julimar Conservation Park (and Drummond Nature Reserve) and Dryandra Woodland Reserve were examined for changes in canopy cover between 1988 and 2005, using Landsat Thematic Mapper™. The proportion of declining, recovering and stable wandoo canopies at each site was assessed and trend analysis maps were produced using Vegmachine (CSIRO) software. Field investigations helped confirm the accuracy of the data to predict tree decline events.

Trend analysis indicates that although crown decline in wandoo has occurred (and is still occurring) at a number of locations, recovery of wandoo crowns from epicormic growth is also evident. Over most areas, wandoo canopies appear to have stablised.

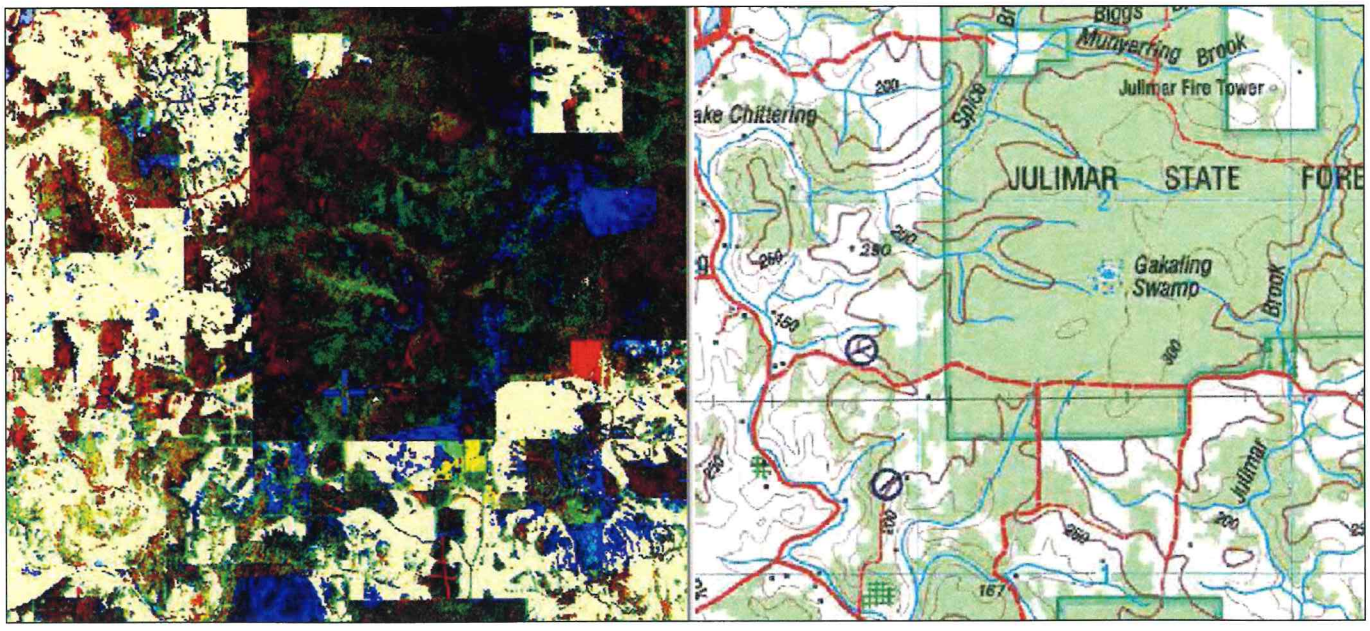


Figure 1. Trend summary (dual image from Vegmachine) 1988-2005.

Site	Decline	No Change	Recovery	Loss/gain ratio
Julimar Conservation Park	17%	79%	4%	2.75:1
Helena catchment	17%	72%	11%	1.5:1
Dryandra Woodland Reserve	18%	59%	23%	1:1

Figure 2. Table showing proportions of declining, recovering and stable wandoo canopies at Julimar, Helena and Dryandra between 1988 and 2005.

The Landsat image (Figure 1 left) depicts areas of vegetation decline (red), recovery (blue) stable (black) and cleared land (white). A contour map of the same location (Figure 1 right) shows roads, creek-lines, farmland and forest areas,

Landsat™ appears to be a useful tool to identify areas where decline is continuing, and a permanent network of monitoring stations will be established using Landsat™ reference points. The full report for this project is yet to be finalised.

Photo: Community survey of wandoo crown condition at Crossman Reserve West. (Photo - R. Hooper)

Community surveys

WRG is facilitating collaboration by coordinating a series of community-based surveys aimed at monitoring the health status of local stands of wandoo. Community groups and volunteers use a ground survey technique based on visual assessment outlined in the WRG assessment guide 'Surveying wandoo crown decline – A guide for assessors'. Results from these assessments will help determine the crown condition based on the frequency and severity of the crown decline, and will assist broadscale mapping.

Thirty-two surveys have been completed at 13 monitoring sites on private land, nature reserves and national parks near Crossman, Narrogin, Chittering, Kojonup, Katanning, Boyup Brook and within the Helena catchment. These surveys provide information on stand structure (number and density of trees), extent of active flagging and current crown health at each site. Researchers from DEC's Science Division have analysed the survey data and a progress report is currently being prepared. Some interesting results have emerged from these surveys and highlights of the report will be circulated to project participants via a newsletter. A copy of the complete report will be posted on the WRG website. Continued seasonal monitoring of these and other sites will help clarify understanding of decline and recovery cycles of wandoo crowns.

Photo: Assessing the health of wandoo crowns at Crossman Reserve West.
(Photo - R. Hooper)

Communication

The health of wandoo and other woodlands was the focus of a Woodland Decline Symposium held in Mandurah in November 2006, with more than 260 researchers, community members and representatives from industry and government attending. Management implications of research findings were presented, collaborative opportunities identified, and feedback sought from community, business and industry sectors. The symposium represented an important milestone in understanding woodland decline and how it could be addressed.

Figure 3. The location of wandoo crown condition survey sites across the south-west of Western Australia. The green boundary shows the approximate limit of the distribution of wandoo. Small populations can occur outside this boundary

More information

Copies of reports and information about wandoo, WRG projects and research are available electronically from DEC's NatureBase website, www.naturebase.net. Future reports will also be published on the website. For more information on WRG or to subscribe or unsubscribe to this newsletter, please contact Executive Officer, Liz Manning on 0427 441 482 or email lizmanning@bigpond.com.

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