

**Eucalypt regeneration on the Lower Murray  
floodplain, South Australia**

by

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## ABSTRACT

Vegetation along the River Murray floodplains has been shown to be in a severe state of decline. This decline is amplified by the impositions of river regulation. In South Australia, where vegetation losses have been great, regeneration is limited and may result in not only individual tree losses but also widespread population decline. This study aimed to examine the relationship between river flows and the regeneration process in populations of *Eucalyptus camaldulensis* and *Eucalyptus largiflorens*.

The current structure of the populations was examined to determine if a viable number of varying age-classed trees were present. Tree surveys conducted at Banrock Station determined that while densities were low for both species, *E. camaldulensis* had a more sustainable population structure than *E. largiflorens*. Growth stages for both species illustrated highly clumped distribution, which is believed to correspond with river flooding magnitudes and frequencies.

To address the potential link between tree distribution and flooding within the River Murray, a hydrological analysis was conducted for Banrock Station using river flows at the South Australian border from 1900 to 2003. The amount of time growth stages for each species were inundated was found to be greatly reduced under regulated flows compared to natural flows. This has resulted in shifted localized regeneration patterns corresponding with *E. camaldulensis*' greater demand for inundation than *E. largiflorens*. Moderate magnitude flows have been most impacted by regulation, and consequently these are the very flows needed for floodplain tree population maintenance.

Flowering and seed fall for *E. camaldulensis* and *E. largiflorens* were monitored at Banrock Station for 22 months to identify losses in reproductive potential resulting from tree decline. While seed viability was not affected by vigour, trees with visually reduced vigour were found to produce less fruit and had reduced seed fall, as well as a reduced rate of fruit development.

Dendrochronological techniques were applied to floodplain trees. Age and size relationships could be established, implying that such techniques can be applied in South Australia to high quality sites. Growth responses within cohorts were similar and easily matched between individuals illustrating cyclic, but not necessarily seasonal correlations. This work verified the preferential selection of younger trees for dendroecological studies, and identified a relationship between on moderate flows and measurable girth expansion in both floodplain tree species.

## **DECLARATION OF ORIGINALITY**

I certify that this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any university; and that to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text.

I consent to a copy of my thesis being available for loan and photocopy once deposited in the University Library.

Amy Kathryn George

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