

Fire and vegetation patterns in semi-arid southern Western Australia

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Lake Johnston region, Western Australia

- semi-arid eucalypt woodland and shrubland at the eastern margins of the WA Wheatbelt (Fig. 1)
- some of the largest remaining tracts of intact eucalypt woodland
- relatively undisturbed, unallocated crown land subject to only minimal fire intervention
- incidence of human-caused fires is low, however, extensive lightning-caused wildfires occur every few years (e.g. Plate 1a)
- very limited knowledge of fire history and its ecological consequences.
- available aerial photo-mosaics (1958) & satellite images (1972-)

Objective

Examine factors influencing 'natural' temporal and spatial patterns of fire, and how these patterns influence vegetation distribution and structure in the Lake Johnston region.

Approach

Step One: Reconstruct & characterise fire history of the Lake Johnston region

This project will provide a database of much-needed fire history information for the Lake Johnston region by:

- a) mapping extent & occurrence of fires since ~1950 from available aerial photos and satellite images.
- b) creating maps of age distribution (*time since last fire*) and fire frequency (*number of repeated fires*)
- c) calculating area burnt annually, fire frequency (FF), fire cycle (FC) and mean fire return interval (MFR)

Step Two: Validate fire history database

Two native conifers; *Callitris tuberculata* & *C. roeii* are widespread in the Lake Johnston region. These two species:

- i) are potentially long-lived (300-400 yrs),
- ii) exhibit distinct (annual) growth rings, and
- iii) are obligate seeders, generally killed outright by fire.

Age class structure and distribution of *Callitris* stands will be examined as proxy measures of *time since fire* (age of live trees) and *fire interval* (age of fire-killed trees).

These data will then be correlated with fire history mapped from aerial images.

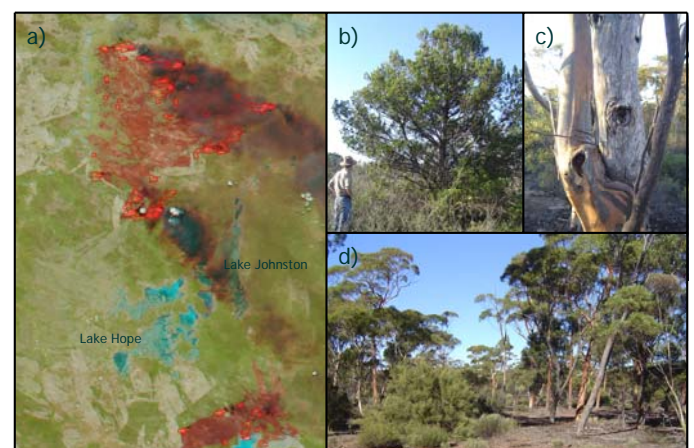


Plate 1: a) Satellite image of fires burning in the Lake Johnston region in December 2001 (older fire scars are also visible as pale brown patches), b) *Callitris tuberculata*, c) fire-scarred eucalypt showing potential to resprout following damage to the main stem, d) Salmon Gum (*Eucalyptus salmonophloia*) woodland in the Lake Johnston region.

Step Three: Examine fire & vegetation patterns

Anecdotal evidence from the Lake Johnston region has raised the following hypotheses:

- 1) Fire spread is dictated mainly by previous fire history, vegetation distribution, and natural barriers (i.e. salt lakes)
- 2) Fire is one of the most important modifiers of vegetation - some vegetation types are more flammable than others (i.e. mallee more flammable than single-stemmed woodland)
- 3) Frequent, high intensity fires are responsible for structural changes in eucalypt woodlands (single- to multi-stemmed)

These hypotheses will be investigated using the fire history database generated in step one.

Outcomes

This project will provide critical fire history information and knowledge of landscape-scale fire disturbance for the Lake Johnston region, which can form a basis for investigating impacts of fragmentation on fire regimes in adjacent areas of the Wheatbelt. Findings from this project will contribute towards the development of scientific expertise relevant to fire management in semi-arid landscapes.

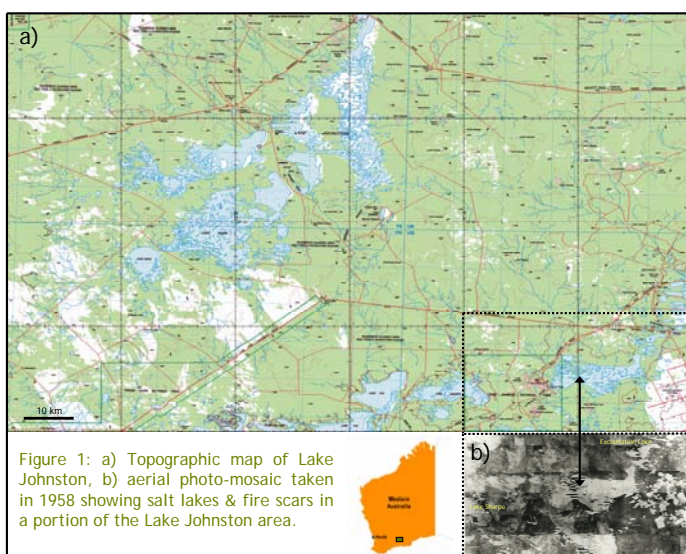


Figure 1: a) Topographic map of Lake Johnston, b) aerial photo-mosaic taken in 1958 showing salt lakes & fire scars in a portion of the Lake Johnston area.

Acknowledgements

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