

Variable densities of jarrah (*Eucalyptus marginata*) and marri (*Corymbia calophylla*) following bauxite mining

Tai White-Toney
RIAWA – Sept. 2016



PRINCIPAL ADVISOR: Dylan Korczynskij
ADVISOR: Max Bulsara



ADVISOR: Andrew Grigg
FIELD ASSISTANCE: Cam Richardson
FIELD ASSISTANCE: Cam Blackburn



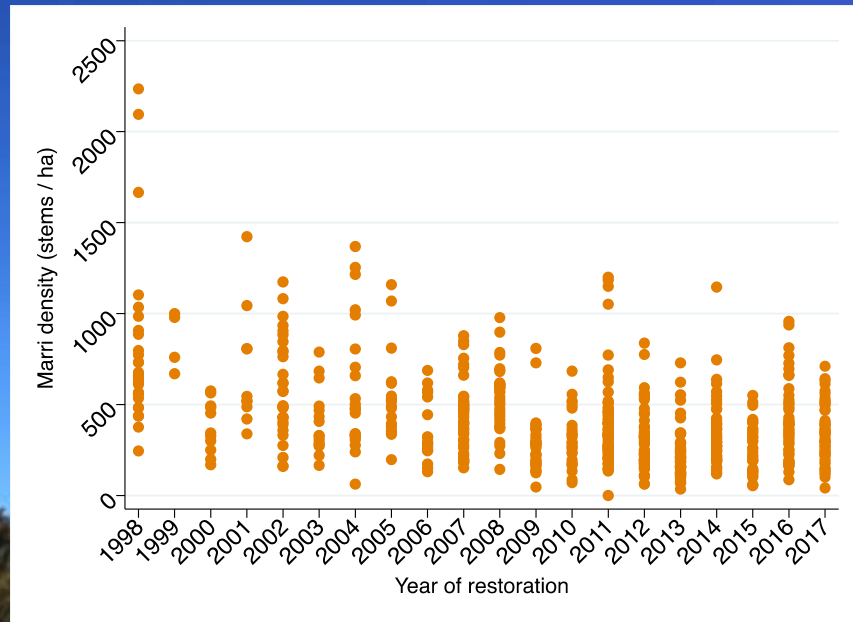
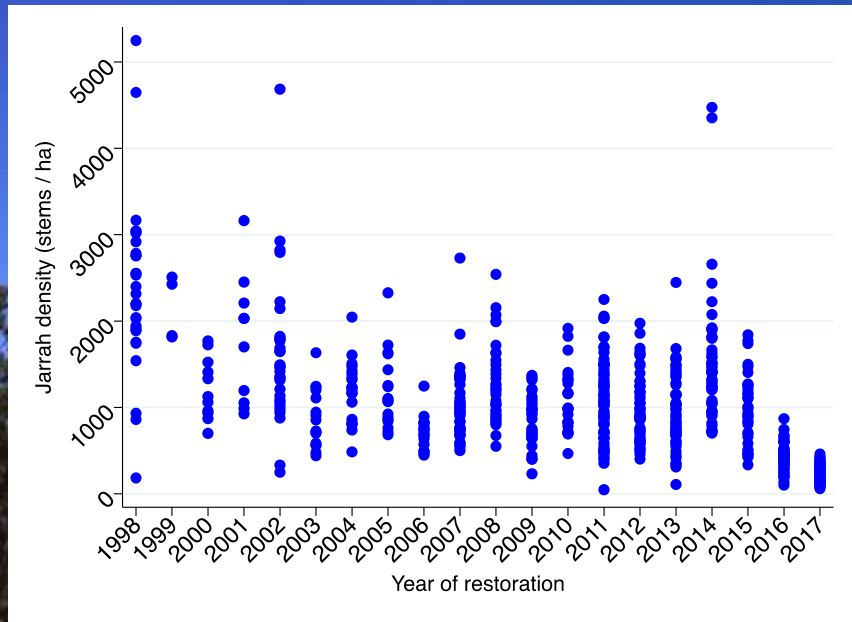
A landscape photograph showing a transition from a dense forest on the left to a cleared mining area on the right. The forest consists of tall, dark trees with green foliage. The cleared area is a flat, reddish-brown field. In the distance, there are more trees and hills under a cloudy sky. A small yellow vehicle is visible in the cleared area.

Previous studies:

From the forest...

...to the mine

Variability in jarrah and marri density explained by changing to restoration practices and climate



OVERVIEW

What are the major ecological factors explaining variable density of jarrah and marri following bauxite mining?



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Ecological factors affecting establishment in the field: soil chemistry and microhabitat



Are patterns of mortality and distribution related to microhabitat and species?

Response variable: number of days observed alive, per individual eucalypt



What ecological factors increase or decrease establishment density?

Response variable: cumulative density of eucalypts, per plot

Ecological factors affecting establishment in the field: soil chemistry and microhabitat

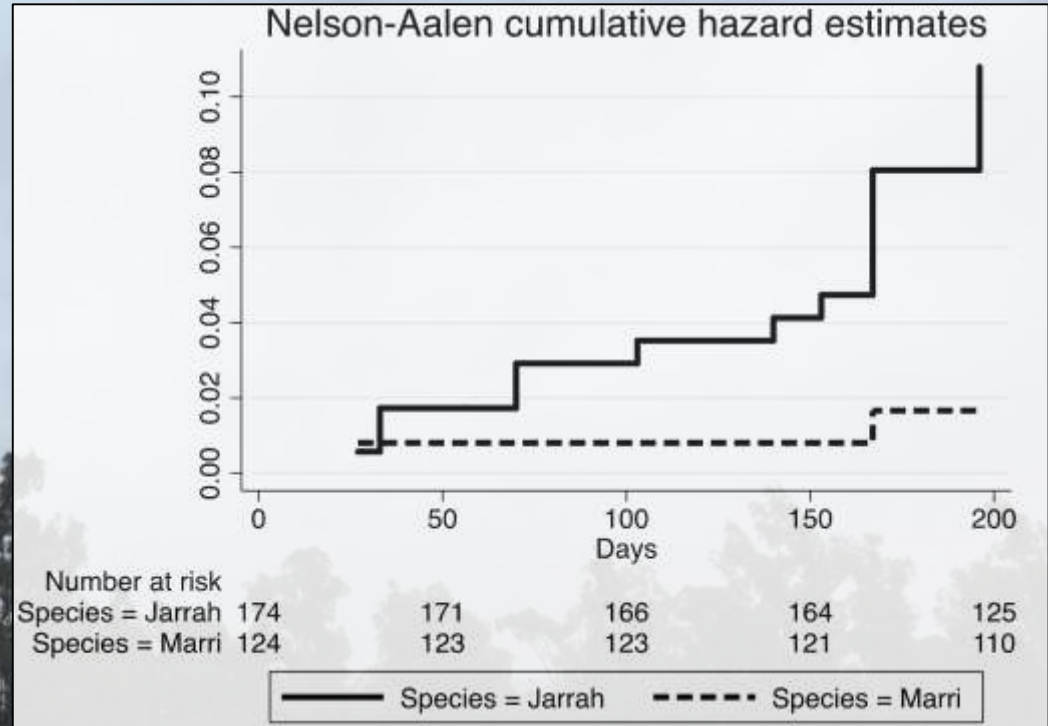
Long rank test by microhabitat: not significant

Log rank test by species: $p < 0.0002$

Proportional hazards test: $p < 0.7471$

Cox analysis: $p < 0.0001$

Hazard ratio: 5.62



**JARRAH IS 6x MORE LIKELY
TO EXPERIENCE MORTALITY**

What ecological factors increase or decrease establishment density?

- GLM – 19 factors, one model per species
- Jarrah and marri impacted by different factors
- No fertiliser applied at time of study

Are patterns of mortality & distribution related to microhabitat and species?

- Microhabitat not significant, but observed differences
- Jarrah 6x more likely to experience mortality between emergence and establishment



Presence of seed in cleared forest topsoil: framework

Harvesting commercial timber



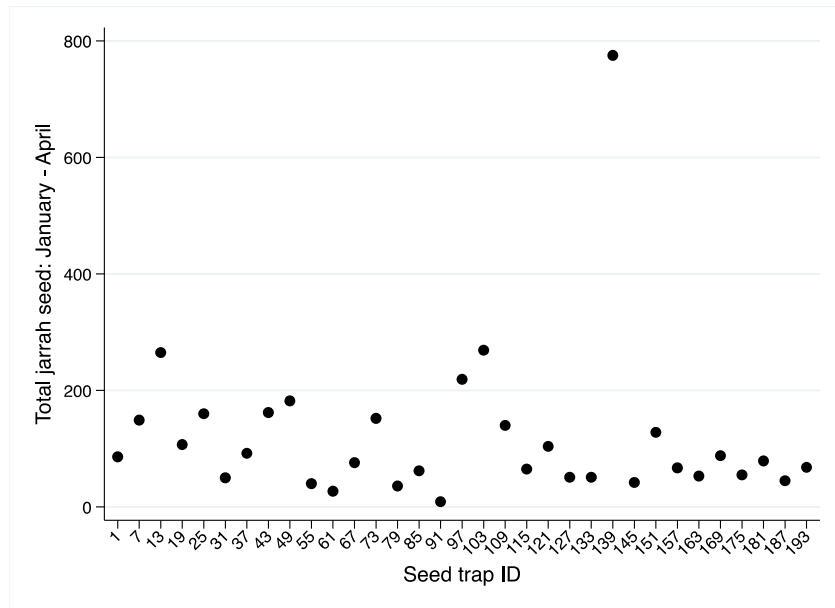
Clearing forest



Stockpiling donor topsoil

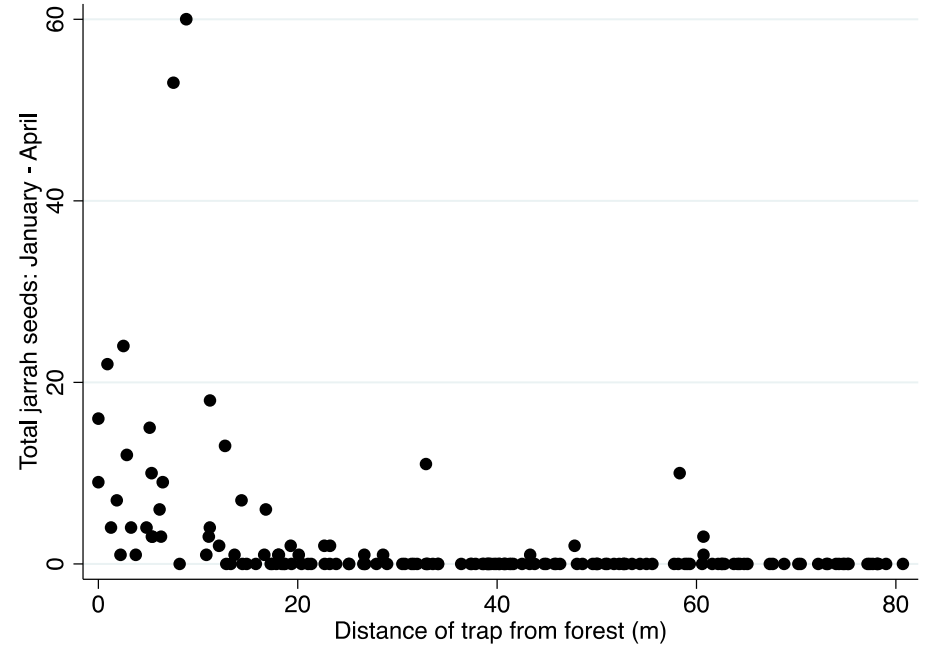


Presence of canopy-stored seed in forest





Presence of canopy-stored seed in restoration



PRELIMINARY CONCLUSIONS

What are the major ecological factors explaining variable density of jarrah and marri following bauxite mining?

(1) Climate: negative response to increasing maximum temperatures (jarrah) and extreme temperature conditions (marri)

(1 & 2) Restoration practices: jarrah and marri densities are fairly resistant to long-term changes, and limited factors influence jarrah and marri field density

(2 & 3) Mortality: higher for jarrah than marri, rip-line microhabitats not significant

(4) Natural recruitment of seed from topsoil? germination trial

(5) Natural recruitment of seed from adjacent? predictions to explain seed movement into restoration sites





THANK YOU

Tai White-Toney | 0437795550
tai.white-toney@my.nd.edu.au