

FORESTCHECK: The response of vascular flora to silviculture in jarrah forest

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Background

Plants are the primary producers in most terrestrial ecosystems forming the basis of the food web. Many other organisms rely on them for food and shelter. The vascular flora of the jarrah forest bioregion includes 3,786 plant taxa of which 2,445 are endemic. Significant factors that have influenced the evolution of the present day flora of the south-west include ancient landscapes undisturbed by recent glaciation, highly leached infertile soils, periodic exposure to episodes of aridity and isolation from mesic ecosystems in south-eastern Australia. Silvicultural operations result in direct disturbance of standing vegetation, plant rootstocks and soil stored seed during the felling and extraction of trees, following which fire is used for regeneration and for protection.

The FORESTCHECK project contributes to adaptive management of Western Australian forests by providing timely and relevant information about the implementation, effectiveness and biodiversity consequences of silvicultural practices in jarrah forest. Monitoring takes place at five locations within four jarrah forest ecosystems at 48 sampling grids. Grids represented examples of reference forest (never harvested or forest that had not been harvested for at least 40 years) and forest subject to either gap release or shelterwood/selective cut silvicultural treatments during the period 1988-2002.

Grids were surveyed over a five-year period with grids at one of the five locations sampled in spring each year. At each grid species richness, abundance and understory structure were assessed in four 1000 m² plots (Ward *et al.* 2011). When possible, voucher specimens were collected for all species.

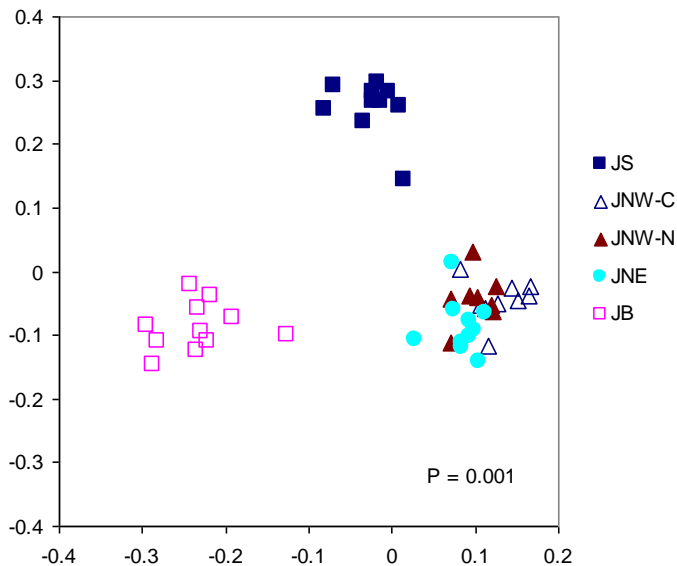
Findings

- A total of 446 plant species were recorded from all monitoring grids.
- There was a strong regional influence in plant community composition which reflects the influence of climatic and edaphic factors on jarrah forest plant communities. The Jarrah North West and Jarrah North East ecosystems had similar species assemblages but were significantly different from those recorded in both the Jarrah Blackwood Plateau and Jarrah South ecosystems.



- Silvicultural treatments had no significant long-term effect on mean species richness and abundance of understorey plants. However, silvicultural treatments affected plant community composition; favouring species with an abundant seed store but not species with woody stems that are vulnerable to mechanical disturbances.
- *Xanthorrhoea preisii* (a grass tree) was significantly less common in harvested treatments compared to reference forest. *Allocasuarina fraseriana* (a small to medium tree) and *Kennedia coccinea* (a vine) were more common on harvested grids.

Left: *Xanthorrhoea preisii* was less common in harvested forest



Left: CAP ordination based on species assemblages for each FORESTCHECK grid. The ordination compares assemblages and identifies differences. Grids with similar assemblages group together. The ordination shows that grids from the Jarrah North West (central, JNW-C and northern JNW-N) and Jarrah North East (JNE) ecosystems had similar species assemblages but were significantly different from those recorded in both the Jarrah Blackwood Plateau (JB) and Jarrah South (JS) ecosystems.

- Fire had no long-term effect on understorey plant species richness.
- There were more species of small and medium shrubs on grids in reference forest than on grids in silvicultural treated forest; however, the majority (70%) were only recorded on one grid. This reflects the natural variation of plant species distributions in jarrah forest, and the different times since treatment sampled within the grids.



Above: Plants common in the jarrah forest understorey; left, *Thyshanotus multiflorus*; centre, *Lechenaultia biloba*; right, *Pimelea rosea*

Management Implications

Soil disturbance associated with harvesting operations is a contributing factor in altering plant species composition. Silvicultural guidelines introduced in 2004 place increased emphasis on reducing soil disturbance and protecting grass trees during timber harvesting operations. The effectiveness of these guidelines will be investigated through further FORESTCHECK monitoring.

Floristic data collected for the FORESTCHECK project support the existing classification system for forest ecosystems.

Reference:

Ward, B., Robinson, R.M., Cranfield, R.J. and Williams, M.R. (2011) FORESTCHECK: The response of vascular flora to silviculture in jarrah (*Eucalyptus marginata*) forest. *Australian Forestry* **74**, 276-287.