

Progress Report SP 2011-020

Long-term stand dynamics of regrowth forest in relation to site productivity and climate

Ecosystem Science

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Project Team

granted

Program Leader

required

Directorate

required

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Context

This project provides information to underpin the management of karri and jarrah regrowth stands in the immature stage of development (25-120 years old). Regenerated stands have important values for future timber production, biodiversity conservation and as a store of terrestrial carbon. Immature karri stands that regenerated following timber harvesting and bushfire comprise more than 50,000 hectares and represent around one third of the area of karri forest managed by the department. Large parts of the jarrah forest are also comprised of predominantly even-aged regrowth. There are a number of well-designed experiments that investigate the dynamics of naturally regenerated and planted stands managed at a range of stand densities. These experiments span a range of site productivity and climatic gradients and have been measured repeatedly over several decades, providing important information to support and improve management practices.

This project addresses emerging issues for the next decade of forest management, including climate change and declining groundwater levels, interactions with pests and pathogens, and increased recognition of the role of forests in maintaining global carbon cycles. The scope of this project has been broadened to include thinning response of even-aged jarrah stands, with all thinning experiments now covered by this single project plan.

Aims

- Quantify the response of immature karri and jarrah stands to management practices that manipulate stand density at establishment or through intervention by thinning. Responses will be measured by tree and stand growth, tree health and other indicators as appropriate (e.g. leaf water potential, leaf area index).

Progress

- The effects of thinning on growth and inter-tree competition in regrowth stands of jarrah and karri have been analysed using data from long-term experiments at Inglehope and Sutton forest blocks, respectively. A paper on modelling growth in karri and marri has been published in *Forest Ecology and Management*. Another manuscript on karri growth response and thinning is in review and a final manuscript investigating the effects of above and below ground competition in jarrah and karri forests is ready for submission.

Management implications

- Thinning concentrates the growth potential of a site onto selected trees and provides forest managers with options to manage stands for particular structural characteristics that may be important for future yield of wood products, wildlife habitat or resilience to disturbance. Thinning is also an important tool for managing streamflow and groundwater levels in forested catchments in the face of a drying climate.
- Tree mortality associated with *Armillaria* root disease appears to reduce in older karri stands, and small gaps created by dead trees become less evident as stands mature. Localised tree mortality can be regarded as a natural process and is likely to contribute to patchiness in the mature forest. However, the extent of tree mortality in silviculturally managed stands should be monitored to ensure that stand productivity and other forest values remain within acceptable ranges.

Future directions

- Finalise publication of tree growth response at Inglehope and Sutton thinning experiments.
- Undertake periodic measurement of long term silvicultural experiments.
- Review findings and utilise data from long-term thinning experiments to inform future management options for maintaining forest health and productivity in a drying climate.