

## **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**

granted

**Directorate**

required

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

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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 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 predominantly of 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.

## Aims

To 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 scope of this project has been broadened to include thinning response of even-aged jarrah stands, with all thinning experiments now covered by a single project plan.
- Re-measurement of tree diameter and bark thickness was completed in the long-term thinning experiment in 100 year old regrowth jarrah forest at Inglehope block near Dwellingup. Data from the experiment is being used to verify predictions from a process-based forest growth simulator.
- Initial planning commenced for a second thinning of the experimental site in 45 year-old regrowth karri forest at Warren block near Pemberton.

## 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 obvious 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

- Collate tree growth data from the Inglehope experiment and make data available for verification of growth simulations by Forest Management Branch.

- Analyse and report on trends in tree and stand growth at Inglehope, with a focus on links between climate and growth.
- Plan for second thinning at Warren, with the intent of maintaining an experimental design compatible with long-term monitoring of stand growth and health.