

## **Progress Report SP 2000-003**

# **Hydrological response to timber harvesting and associated silviculture in the intermediate rainfall zone of the northern jarrah forest**

**Ecosystem Science**

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**Project Team**

granted

**Program Leader**

granted

**Directorate**

granted

# Hydrological response to timber harvesting and associated silviculture in the intermediate rainfall zone of the northern jarrah forest

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## Context

This is a long-term experiment established in 1999 to address part of Ministerial Condition 12-3 attached to the *Forest Management Plan 1994-2003*. Ministerial Condition 12-3 states that the department shall monitor and report on the status and effectiveness of silvicultural measures in the intermediate rainfall zone (900-1,100 mm/yr) of the jarrah forest to protect water quality.

## Aims

- Investigate the hydrologic impacts of timber harvesting and associated silvicultural treatments in the intermediate rainfall zone of the jarrah forest in a changing hydroclimate.

## Progress

- Monitoring of groundwater levels, streamflow, stream salinity and stream turbidity continued in Yarragil 4L, 4X, 6C, and Wuraming catchments in the Swan Region.
- Data loggers in Yarragil 4L, 4X and 6C catchments to monitor rainfall, streamflow, stream salinity, and stream turbidity were updated to Unidata Neon loggers, enabling real-time data capture and access remotely via the internet.
- All timber products resulting from the second experimental thinning of Yarragil 4L catchment in 2019 were removed.
- The first phase of silviculture to increase the intensity and duration of the hydrological response following thinning of Yarragil 4L is underway and expected to be completed during winter 2020. This involves felling non-commercial trees not marked for retention and poisoning the stumps.
- An operation to protect retained trees in Yarragil 4L from potential heat damage from subsequent fires is underway and expected to be completed in winter 2020. This involves removing heavy timber debris from a buffer zone around trees.
- A paper giving an overview of the second thinning experiment in Yarragil 4L was published in *The Forester*.
- A paper examining the relative contribution to streamflow generation in jarrah forest streams has been submitted to *Hydrological Processes* and is undergoing review.
- Groundwater bores were remeasured at Crowea, Iffley and Poole experimental catchments in the Warren Region. Sixteen bores remain in contact with the groundwater layer.

## Management implications

- Experimental catchments provide a unique long-term record of the hydrological response of the jarrah forest to climate change and forest management practices.
- Monitoring in these catchments contributes to reporting on KPI 10 for the *Forest Management Plan 2014-23* that relates to stream condition and groundwater level within fully forested catchments.
- Monitoring of experimental catchments helps inform the effects of silviculture treatments on water balance.
- Re-thinning of Yarragil 4L provides an opportunity to examine the effects of the silvicultural treatments on the groundwater and surface water hydrology, biodiversity, and vegetation structure and composition of the catchment.

## Future directions

- Continue monitoring of groundwater levels, streamflow and water quality in the Yarragil catchments.

- Use isotope methods to examine shifts in water use by plants resulting from thinning.
- Synthesise historical fine scale changes in stream hydrological responses and biogeochemistry.
- Conduct a prescribed burn in Yarragil 4L in spring 2020 to remove timber harvesting residue.
- Apply second phase of silviculture in Yarragil 4L by poisoning stump and coppice regrowth following the post-harvest burn.
- Remeasure post-thinning stand density in Yarragil 4L and in adjoining untreated control catchments.