Progress Report SP 2019-048

Investigating the causes of change in forest condition

Ecosystem Science

Project Core Team

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Department of **Biodiversity,**
Conservation and Attractions
GOVERNMENT OF
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Biodiversity and
Conservation Science

Investigating the causes of change in forest condition

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Context

A decline in vegetation density in the north-east of the forest management plan area was noted in *Mid-term review of performance of the Forest Management Plan 2014-2023*. The decline is broadly consistent with climate change predictions, although other factors may be contributing. Previous research suggests that *Eucalyptus wandoo* has been undergoing a series of declines associated with drought and increasing temperatures, and a Buprestid beetle (*Cisseis fascigera*). *Eucalyptus marginata* and *Corymbia calophylla* have been reported to be vulnerable to acute drought and heatwave events at water-shedding sites with shallow soils, as well as frost events.

More information is needed about the landscape, site and stand characteristics that predispose forest to decline. This project will build on the information available and investigate the contributing factors. The project will: 1) investigate vegetation decline trend maps; 2) undertake a rapid forest survey; 3) investigate trajectories in vegetation recovery using satellite imagery; and 4) investigate climatic influences on vegetation condition.

Aims

- Investigate the cause of decline in vegetation density in south-west forests by understanding the interactions of contributing factors.

Progress

- Estimates of vegetation cover derived from Landsat (i35 index) were used to create a stratified decline map of the forest over a 30 year period.
- Climate analysis suggests that decline is associated with lower rainfall for the previous year, and higher vapour pressure deficit over the past seven years.
- Analysis of decline sites compared with control sites (with a relatively stable vegetation cover) indicated that fire and aspect may be implicated in the decline.
- Particular vegetation types showed higher levels of decline than others, including sandy basins and granite outcrops. Preliminary site investigations suggest that, for example, *Banksia* woodland on deep, sandy soils (Goonaping), may be recovering more slowly following fire than other vegetation types.
- Preliminary results from the rapid field assessment suggest that larger canopy trees are experiencing higher levels of canopy reduction in decline sites, compared with control sites.

Management implications

- Knowledge gained from this study can be incorporated into forest management policy and planning, and also contribute to the mapping of forest health and reporting for the next forest management plan.

Future directions

- Using the methods developed for investigating decline in the north-east forest, examine decline correlates in the forest further south.
- Undertake further field work in declining and stable sites to investigate stand and plant variables associated with decline.
- Continue to investigate the time of recovery needed by forest ecosystem types from a range of fire frequencies and fire severities.
- Investigate increasing the accuracy of mapping of the *Banksia* woodland in the northern *Jarrah* forest.