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Coarse woody debris: fertile hotspots?

Microenvironments created by CWD

The ecosystem services provided by coarse woody debris (CWD) have generally been overlooked. There is growing interest in using CWD as a restoration treatment to introduce missing structural complexity to modified ecosystems. However, little is known about how CWD influences the microenvironments it creates, especially in the Australian context.

It is suggested that within modified Australian woodlands, CWD is a source of nutrients and refugia for flora and fauna, creating 'fertile hotspots' within the landscape (Figure1). These hotspots may be important sites for restoring ecosystem function to woodlands.

CWD in modified Australian woodlands

My experiment quantifies the effects of CWD in modified woodlands by investigating six fundamental drivers and responses of ecosystem function (Box 1). The study site supports remnant yellow box (*Eucalyptus melliodora*) – blakely's red gum (*E. blakelyi*) woodlands, typical of those found in south-eastern Australia. These woodlands have the unfortunate coincidence of occurring in areas suitable for agriculture, and now approximately 90% have been cleared. CWD has also been removed from these landscapes, because it is considered an obstacle for grazing animals and machinery.

The study site is within a nature reserve in the Australian Capital Territory (Figure 2), and is part of a long-term landscape-scale restoration experiment. This experiment involves a suite of treatments, including the addition of up to 40 tonnes per hectare of fresh CWD.

I am testing CWD in a range of sizes and decay states. Size is considered important because there is an absence of large CWD (>20cm in diameter, >100cm in length) within the reserve. The decay state is critical as a proxy for the length of time CWD has been in the environment. All experimental CWD selected are in open spaces away from vegetation (trees and shrubs).

Each of the fundamental drivers and responses of ecosystem function are sampled at six locations (three on each side) at 0, 10 and 80cm from the CWD (Figure 3) to test the radius of affect. Most activity in the soil profile occurs near the surface so samples are collected at depths of 0-1, 1-3 and 3-5cm and analysed separately.

Quantifying the value of CWD

Quantifying the value of CWD has implications for Australian agriculture. CWD could be used to prevent the loss of soil nutrients by creating resource traps. It may also provide 'habitat islands' that support localised biodiversity in grazing landscapes. For organisations managing and restoring native woodlands, CWD has the potential to enhance regeneration of woodland species and create 'wildlife corridors'. In addition, CWD could be used to modify hydrological processes to reduce evaporation and erosion.

My project will further our understanding of the effects of CWD and its potential for restoring ecosystem function to modified landscapes.

Figure 1
Decayed log creates microhabitat for fungus

Box 1

Sampling fundamental drivers and responses of ecosystem function:

- soil temperature
- soil moisture
- soil nutrients (C, N, P)
- bulk density (soil)
- soil pH and electrical conductivity
- flora abundance and species

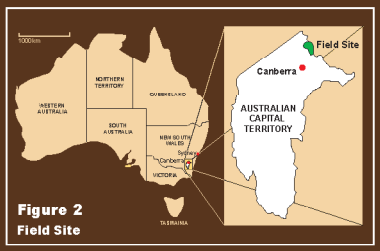

Figure 2
Field Site

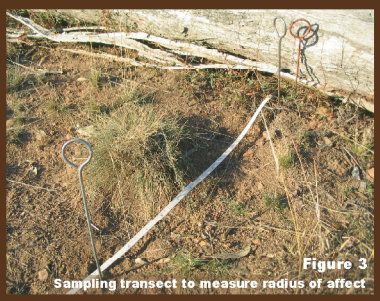

Figure 3
Sampling transect to measure radius of affect

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