

FIRE NOTE

ISSUE 26 NOVEMBER 2008

BURNING UNDER YOUNG EUCALYPTS

Fuels management in eucalyptus plantations is essential to minimise the impact of wildfire. Prescribed burning has the potential to reduce the fuel hazard in plantations, but is not routinely conducted due to concerns relating to tree damage. This project, through a series of experimental burns, addresses the issues of tree damage and recommends minimum tree sizes that are capable of withstanding the effects of low to moderate intensity fires.

Data was collected between 2005 and 2007 over six sites, two species, and three age classes. Fire behaviour data came from 36 experimental burns during winter of 2005 and 2006. Tree response results came from multiple measurements of more than 1700 individual trees.

RESEARCH OUTCOMES

This project has described and quantified the fuel characteristics commonly found in sub-tropical eucalypt plantations from age four to 11. These characteristics have been related to fire behaviour and new fire behaviour models, specific to

young eucalypt plantations, have been developed. The fuel characteristics that most influence fire behaviour in young eucalypt plantations are fuel load, fuel height and fuel moisture content. These characteristics can be used to predict the rate of spread of a fire under benign wind conditions.

A novel technique for assessing the extent of stem damage in eucalypts was developed and described. This technique enables almost instant assessment of stem damage following fire; previous assessment techniques recommend waiting a considerable period of time (up to 2 years) until dead bark dropped off and fire scars were evident. This new assessment technique is suitable for post-fire assessment of any eucalypt species and will provide forest managers with the capability of deciding whether to leave a stand to 'grow-on' or commence recovery operations.

Minimum stem sizes recommended to ensure no long-term damage are between

ABOUT THIS PROJECT

This project was undertaken by Phil Lacy, of Forests NSW.

This is a PhD study through the University of New South Wales/Australian Defence Force Academy

OBJECTIVES

- Profile the types, structure and accumulation of fuels within the eucalypt plantation estate.
- Describe fire behaviour within eucalypt plantations across a range of fuel types, load and structure in varying weather conditions.
- Determine the effect of fire on young eucalypt species across a range of tree sizes and ages, fuel loads, intensities and sites.



▲ ABOVE: RESEARCHER PHIL LACY

SUMMARY

There are more than 880,000 hectares of hardwood plantations in Australia. Of this, some 15 percent are located in a sub-tropical climate.

This project was designed to address the issue of fuels management in young eucalyptus plantations through the use of prescribed burning. The project addresses fuels, fire behaviour, tree damage and tree recovery from low to moderate intensity fires.

▶ RIGHT: THE PROJECT AIMS TO DESCRIBE FIRE BEHAVIOUR WITHIN EUCALYPT PLANTATIONS.





◀ LEFT: THE RESEARCH RESULTS WILL BE CONDENSED INTO A PRESCRIBED BURNING GUIDE FOR FIELD PRACTITIONERS.

END USER STATEMENT

“The research will greatly assist land owners who have eucalyptus plantations, or in some cases even aged regrowth, in the management of fuels in the understorey. Considerable investment has been made in establishing plantations to produce quality sawlogs and incorrect use of prescribed burning can damage, degrade or even kill the crop. The avoidance of the use of fire within the plantations can pose even a greater risk of catastrophic wild fire. The project and the resulting prescribed burning guide will provide practitioners with a guide to control fuel loading with minimal risk to crop quality. Forests NSW has over 50,000 hectares of eucalyptus plantations and along with many other plantations companies will benefit from this valuable tool.”

– *Steve Bishop, Forests NSW*

FURTHER READING

http://www.bushfirecrc.com/students/students/phil_lacy2.html

5-8cm DBH (diameter at breast height; that is, 1.3m above ground level) for *Eucalyptus dunnii* (Dunn's white gum) and 5-13cm DBH for *Corymbia* spp (spotted gum) depending on the quantity of fuel in the plantation. Stem sizes vary because of the variation in bark thickness between species.

PRESCRIBED BURNING

This research provides necessary information to conduct prescribed burning operations in young eucalypt plantations.

The research results will be condensed into a prescribed burning guide for field practitioners. This guide will

describe how to assess the important fuel characteristics, the weather conditions that are suitable for prescribed burning, and provides post-fire assessment methods that aid the determination of adverse stem and crown damage. These post-fire assessment methods could be used for any fire (prescribed or wild) in eucalypt plantations and provide the forest manager with an early indication of future wood quality or growth issues.

FUTURE DIRECTIONS

Further research is needed on other plantation species.

The Brown Line

The brown line forms in the live bark tissue as a response to exposure to elevated temperatures. The depth of the brown line is directly related to the duration of this exposure. Longer exposure to flames leads to greater brown line depth. The brown line indicates bark cell death; all cells from the brown line to the outer bark have been killed from heat exposure.

The depth of lethal heat penetration (the brown line depth) into the bark is directly related to the fuel load immediately surrounding the stem. A new measure – the ‘bark damage ratio’ – provides the forest manager with a prediction of scarring potential or the formation of gum veins. The bark damage ratio is the ratio between the depth of the brown line and bark thickness. A bark damage



ratio of less than 0.5 will not result in the formation of fire scars or gum veins (for Dunn's white gum or spotted gum). It is

expected that this ratio will hold for all other *Eucalyptus* species, but this needs to be confirmed through further research.

Fire Note is published jointly by the **Bushfire Cooperative Research Centre (Bushfire CRC)** and the **Australasian Fire and Emergency Service Authorities Council (AFAC)**.

Bushfire Cooperative Research Centre
Level 5/340 Albert Street
East Melbourne VIC 3002
Telephone: 03 9412 9600
www.bushfirecrc.com

Bushfire CRC is a national research centre in the Cooperative Research Centre (CRC) program, formed in partnership with fire and land management agencies in 2003 to undertake end-user focused research.
Bushfire CRC Limited ABN: 71 103 943 755

Australasian Fire and Emergency Service Authorities Council
Level 5/340 Albert Street
East Melbourne VIC 3002
Telephone: 03 9418 2388
www.afac.com.au

AFAC is the peak representative body for fire, emergency services and land management agencies in the Australasia region. It was established in 1993 and has 26 full and 10 affiliate members.