

# FIRE IN THE LANDSCAPE

**PROJECT LEADER: Tina Bell**

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**LEAD END USER: Neil Cooper**

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## INTRODUCTION

This three year research project will focus on key issues for land management in coming decades – reducing the risk of catastrophic wildfires in forests whilst delivering more high quality water and an improved carbon balance. Carbon storage and delivery of water are clearly recognised as economically important ecosystem services and both are significant areas of research for Australian forests.

For example, most of the water supplied to major cities is sourced from high-rainfall forested catchments. Fire directly and indirectly affects water yield and, after an initial increase, may be reduced by up to 50% of pre-fire levels for several decades .

Similarly, it has been estimated that each of the recent landscape-scale fires in 2003 and 2006-7 in southern Australia released an amount of CO<sub>2</sub> equivalent to nearly 50% of the net annual emissions for 2006.

*It is imperative that we understand the impact of fire management practices on these two important ecosystem services.*

## PROJECT STRUCTURE

The research will investigate above- and belowground carbon and water quality and quantity in four research projects (see aims opposite). Wherever possible the projects will use common research sites and will share students and data which will strengthen outcomes.

## EDUCATION

This research project will support up to six PhD and MSc students. Research will be incorporated into undergraduate and postgraduate courses presented by both participating universities.

## STAKEHOLDERS

Victorian Department of Sustainability and Environment, Parks Victoria, Country Fire Authority, NSW National Parks and Wildlife Service, State Forests NSW, NSW Rural Fire Service, CSIRO (National Carbon Accounting System), Murray-Darling Basin Authority, ActewAGL



### **PROJECT 1 – Greenhouse gas emissions (GHG) from fire and their environmental effects**

**Research leader: Dr Tina Bell, University of Sydney**

1. Further develop our knowledge of GHG emissions from fires and their impacts on the carbon balance of forests
2. Understand mechanisms and processes by which GHG emissions affect environmental aspects of native forests and surrounding agriculture
3. Provide guidelines for management of GHG emissions from prescribed fires to minimise ecological and economic impacts

### **PROJECT 2 – How does fuel reduction burning influence forest carbon storage?**

**Research leader: Dr Chris Weston, University of Melbourne**

1. Quantify the effects of fuel reduction fire on carbon in soil, litter and vegetation in forests
2. Describe how organic matter in the surface and upper soil layers change after prescribed burning in forested ecosystems
3. Determine how rates of carbon turnover are affected by fire



### **PROJECT 3 – Fires and hydrology of north eastern mixed-species forests**

**Research leader: Dr Tarryn Turnbull, University of Sydney**

1. Further develop our existing methods of quantifying overstorey water-use so they can be applied to resprouting mixed-species forests
2. Characterise the physiology of resprouting eucalypts for a range of species, soils and topo-climates
3. Refine existing model (SPA) to predict future tree water-use in regenerating mixed species forests at a landscape level

### **PROJECT 4 – Quantifying water quality risks following wildfire**

**Research leaders: Assoc Prof Pat Lane and Dr Gary Sheridan, University of Melbourne**

1. Quantify the frequency and magnitude of post-fire debris flows to help understand the risk to water quality
2. Develop a water quality risk model (fire-storm intersection model) that can be applied across a broad spectrum of forested catchments
3. Undertake a systematic investigation of the relationship between fire severity, post-fire runoff and erosion response in dry forests for different soil types (e.g. clay loam, sand)