

Forest Carbon Balance and Emission Management

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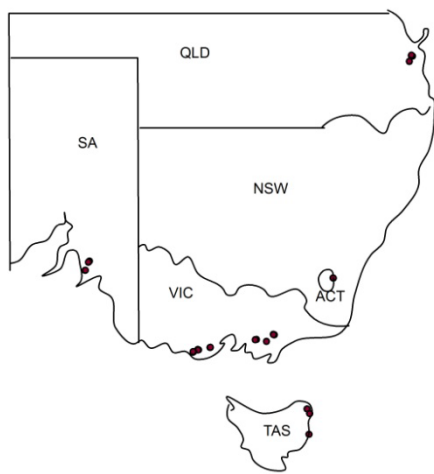


Fig. 1. Study plots ●, n=52

Research Objectives

- Measure the immediate impact of prescribed burning on carbon balance across a range of forests and burn conditions
- Develop a better knowledge base to enable end-user agencies to model the immediate consequences of prescribed burning on both carbon and greenhouse gas (GHG) emissions

Approach, Study sites and Methods

- A total of 61 plots were established across south-east Australia, 52 plots were measured for carbon before prescribed fire using standard forestry techniques (Fig 1); 38 plots were burnt in planned fire and re-measured afterwards; 3 plots were established in wildfire affected forests (Aberfeldy, VIC); 6 plots were established in frequently burnt forest in QLD

Results

Pre-fire forest carbon to 30 cm soil averaged 213 ± 9 tC/ha across all sites (n=37)

3-5% of total forest C from all carbon pools is emitted to the atmosphere

Most emitted C is derived from components not included in National emission estimates (Fig.2)

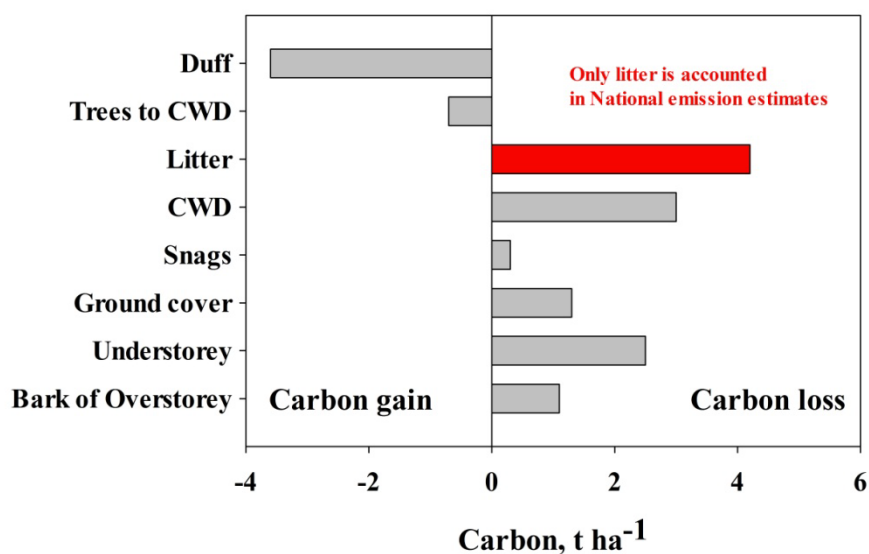


Fig 2. Carbon loss (+) and gain (-) after planned fire, n=38

Nationally, only loss of fine fuels (litter) is accounted in emission from planned fire so that more than 50% of emitted C is not accounted (see Fig.2)

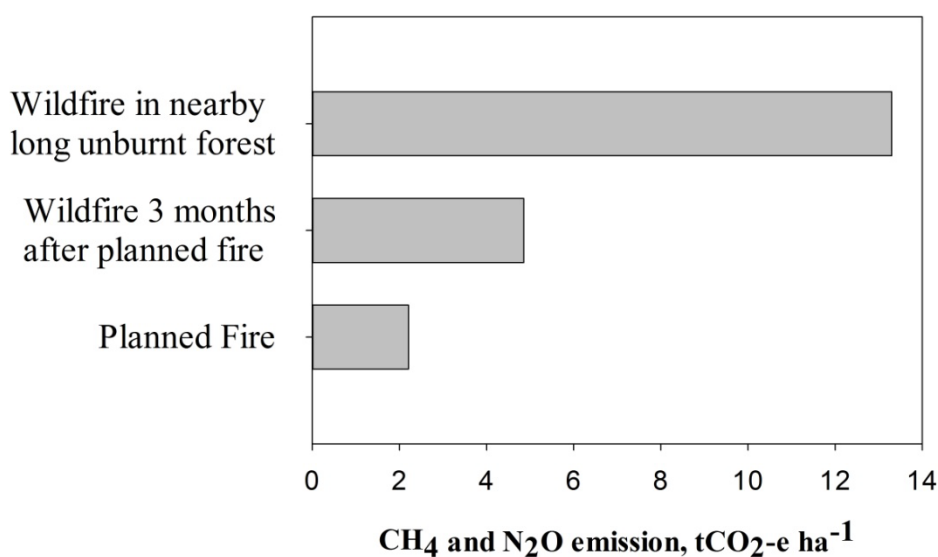


Fig. 3. Estimated non-CO₂ emission released in planned fire, October 2012, in wildfire burnt through fuel treated forest and in long unburnt forest, in January 2013 (Aberfeldy wildfire)

>70% of fire related emission is CO₂

For the high global warming potential gases CH₄ and N₂O, wildfire released 13 tCO₂-e ha⁻¹ compared with 2 tCO₂-e ha⁻¹ following planned fire (Fig. 3)

Planned burning 3 months prior to the wildfire reduced CH₄ and N₂O emissions to 50% of wildfire emissions

End user statement: "Carbon balance and emission management is an international issue deservedly receiving an increasing focus. As land managers and fire managers we often have direct impact on carbon emissions when undertaking planned burning. It is therefore crucial to be able to understand forest carbon dynamics and to be able to predict the likely carbon impact when undertaking planned burning. This research delivers on this need"

Neil Cooper, Manager Fire, Forest and Roads, ACT Parks and Conservation Service