Geophysical Research Abstracts
Vol. 16, EGU2014-4618, 2014
EGU General Assembly 2014

Evapotranspiration following wildfire in resprouting eucalypt forests: from leaf to catchment

Rachael Nolan (1,2), Patrick Lane (2), Richard Benyon (2), Ross Bradstock (3), and Patrick Mitchell (4)

(1) Hawkesbury Institute for the Environment, University of Western Sydney, (2) Department of Forest and Ecosystem Science, The University of Melbourne, (3) Centre for Environmental Risk Management of Bushfires, University of Wollongong, (4) CSIRO Sustainable Ecosystems

Forests which recover from disturbance predominately via vegetative resprouting may be expected to have different catchment water balance dynamics following wildfire than forests recovering from seed. However, the impacts of wildfire on evapotranspiration (Et) are largely unknown in resprouting forest types. This is despite their dominance across the majority of southern Australia's forested catchments and the large areas burnt in recent years.

Following wildfires in south-eastern Australia in 2006 and 2009, we monitored Et over two years using a combination of sapflow, rainfall interception and forest floor Et methods. We also measured changes in forest structure and leaf physiology. We found that fire initially reduced Et, but this recovered rapidly and even increased above rates observed in unburnt forest. Post-fire changes in Et were dependent on fire severity with higher rates only observed in forest burnt at moderate severity (<70% canopy scorch). Measurements of leaf physiology indicated higher rates of stomatal conductance in seedlings, and to a lesser extent in resprouting epicormic leaves, which may be driving higher rates of water use per unit leaf area in regenerating forest compared to unburnt forest. We also found higher leaf area index in burnt forest over 2-3 years post-fire. These results demonstrate that resprouting forest types have a relatively rapid recovery of Et due to both leaf-scale physiological processes and recovery of stand-scale leaf area.

These plot-scale observations of Et were compared with changes in streamflow measured from a catchment burnt mostly at moderate severity in 2006. Time-trend analysis on pre- and post-fire streamflow found that mean annual water yield reduced by an average 197 mm over 1-4 years post-fire. This was attributed to both drought, which was estimated to account for 54% of reductions, and increased Et across the catchment following fire, which is consistent with plot-scale observations.