

MANAGING POST-FIRE SOIL EROSION IN THE MOUNT LOFTY RANGES, SOUTH AUSTRALIA

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Introduction

Post-fire soil erosion can alter ecosystems by affecting water quality, soil formation and general landscape characteristics. Management options to mitigate post-fire soil erosion depend on the geomorphology, fire regime, season and rainfall characteristics. This research focuses on various case studies of differing fire types in the Southern Mount Lofty Ranges (SMLR) (Fig 1).

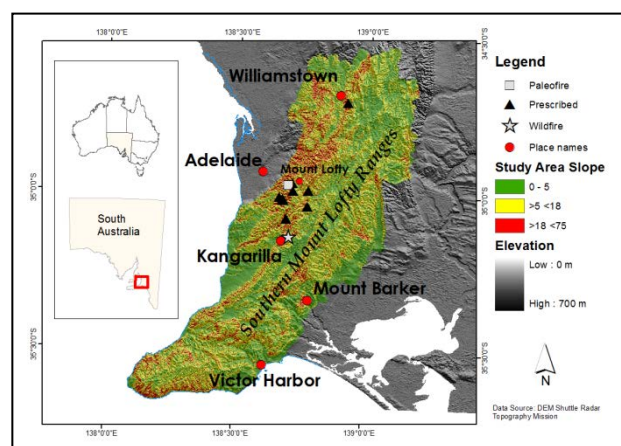


Figure 1: Location map

Paleofires

Research into the Wilsons Bog paleofire located in Cleland National Park, SA (Fig 2), established that post-fire erosion is a natural process that is sensitive to climatic variations that in turn influence vegetation cover. The analysis of charcoal in the stratigraphic soil profile recorded at least fifteen separate fire events that caused post-fire deposition during the period from 6000 years before present.

Buckman S., Brownlie K., Bourman R.P., Murray-Wallace C.V., Morris R.H., Lachlan T.J., Roberts R.G., Arnold L.J and Cann J.H. (2009) Holocene palaeofire records in a high-level, proximal valley-fill (Wilsons Bog), Mount Lofty Ranges, South Australia. *The Holocene*. 19,7,1-13.



Figure 2: Stratigraphic section at Wilsons Bog

Wildfires

Post-fire sediment movement is influenced by hillslope morphology. Managers (Fig 3) can predict the likely areas of concentrated post-fire soil erosion and deposition with a good working knowledge about hillslope morphology.

Morris R., Dragovich D. and Ostendorf B. (2012) Hillslope erosion and post-fire sediment trapping at Mount Bold, South Australia. *Proceedings of Wildfire and Water Quality: Processes, Impacts and Challenges Conference*, 11–14 Jun 2012, Banff, Canada, IAHS Publ. 354, 42-50.



Figure 3: Installing sediment barrier traps

Prescribed fires

Sediment movement following prescribed fires depends on the fire severity, slope angle and rainfall. Based on assessment of 10 prescribed burns in the SMLR, over 50% of the 505 sites indicated post-fire sediment movement. Reducing the fire severity from high to low will reduce the likelihood of sediment movement by 52%. A simple visual assessment framework has been developed to monitor post-fire erosion.

Morris R., Buckman S., Connelly P., Dragovich D., Ostendorf B. and Bradstock R. (2011) The dirt on assessing post-fire erosion in the Mount Lofty Ranges: comparing methods. R.P. Thornton (Ed) 2011, *Proceedings of Bushfire CRC & AFAC 2011 Conference Science Day*, 1 Sept 2011, Sydney Australia, Bushfire CRC, 152-169.

End User Statement

Danni Boddington, Fire Manager, SA Water

Managing post-fire erosion is critical to healthy drinking water. SA Water has incorporated this CRC research into our ongoing management of fires in water reservoirs.

Restoration options

Typical post-fire mitigation strategies involve the use of sediment barriers (Fig 3). Based on a case study at Mount Bold of 53 sediment traps it was concluded that after a 1 in 5 year rainfall event, sediment traps will not prevent post-fire sediment movement from reaching water reservoirs (Fig 4).

Morris R., Calliss S., Frizenschaf J., Blason M., Dragovich D., Henderson M. and Ostendorf B. (2008) Controlling sediment movement following bushfire - a case study in managing water quality, Mount Bold, South Australia. *Proceedings of Water Down Under 2008 incorporating 31st Hydrology and Water Resources Symposium and 4th International Conference on Water Resources and Environment Research*, 14-17 April 2008, Adelaide, Australia., 1937-1947.



Figure 4: Overflowing sediment barrier trap

Key findings

- Post-fire soil erosion is a natural process in the Southern Mount Lofty Ranges that can be influenced by differing fire management practices.
- Patterns of sediment movement are influenced by hillslope morphology.
- In the SMLR altering the fire severity from low to high during prescribed burns will increase the probability of sediment movement by 52%.
- Sediment barriers will reduce but not prevent post-fire charcoal-rich sediment and debris reaching water reservoirs after a 1 in 5 year rainfall event.

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