SOIL CARBON AND WATER REPELLENCY RESPONSE POST-WILDFIRE

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Background

Wildfire is known to cause considerable changes within a catchment, resulting in loss of vegetation and litter cover, a decrease in decomposed organic matter and changes in soil properties, causing changes in water yield (DeBano *et al*., 1998). These variables identified in studies conducted in water supply catchments for Melbourne water supply catchments. Due to the different landscape and species composition, this study focuses on the Sydney water supply catchments.

Study Area and Methods

The research project examines the effects of wildfire on Sydney water supply catchments (Figs. 1 and 2). The results focus on a small component of the research project examining the response of soil total carbon and water repellency in two study areas (Cranebrook and Wentworth Falls), following a separate wildfire event at each area in late 2009 (see Fig. 1). Soil samples were collected in the field 6, 12 and 36 months for after the wildfire event at each site, for 5 burn severity classes (unburnt to very high burn severity), at 0-2 cm and 2-5 cm along a 10 m transect. The carbon and repellency data was analysed by incorporating an analysis of variance (ANOVA). The data was then examined according to 1) time vs. burn severity; 2) burn severity class; and 3) time.

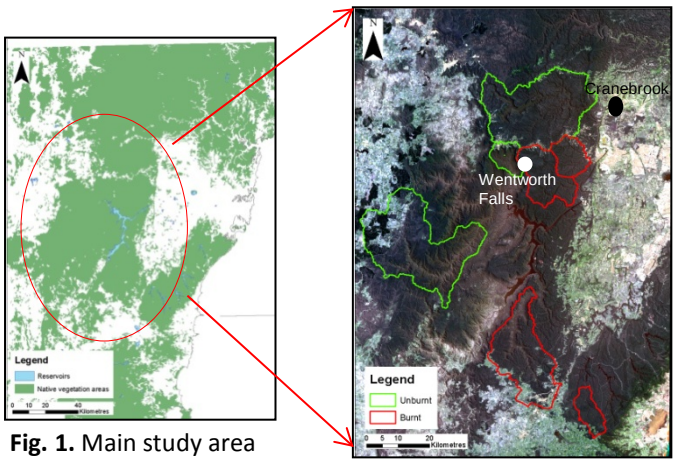


Fig. 1. Main study area

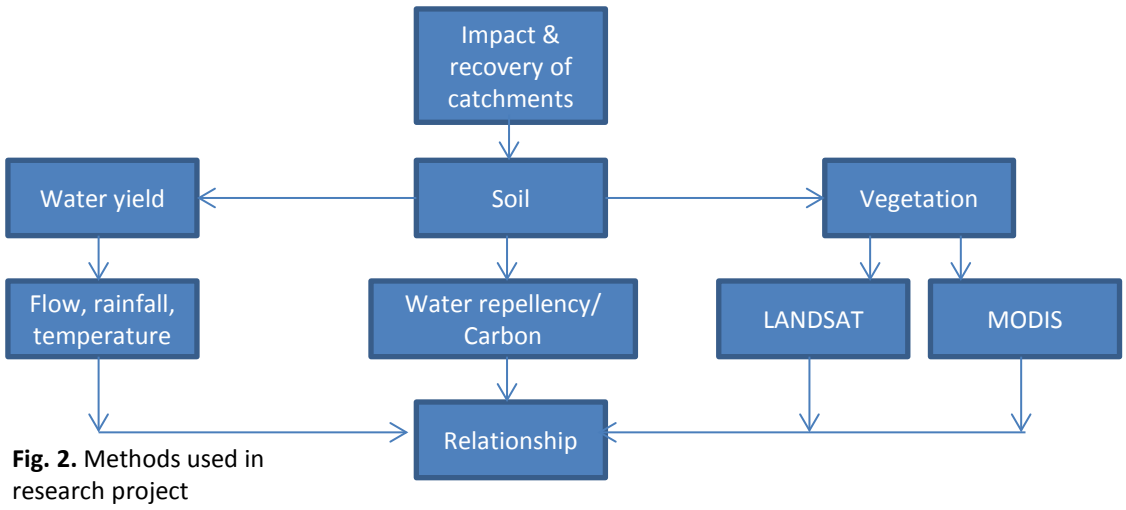


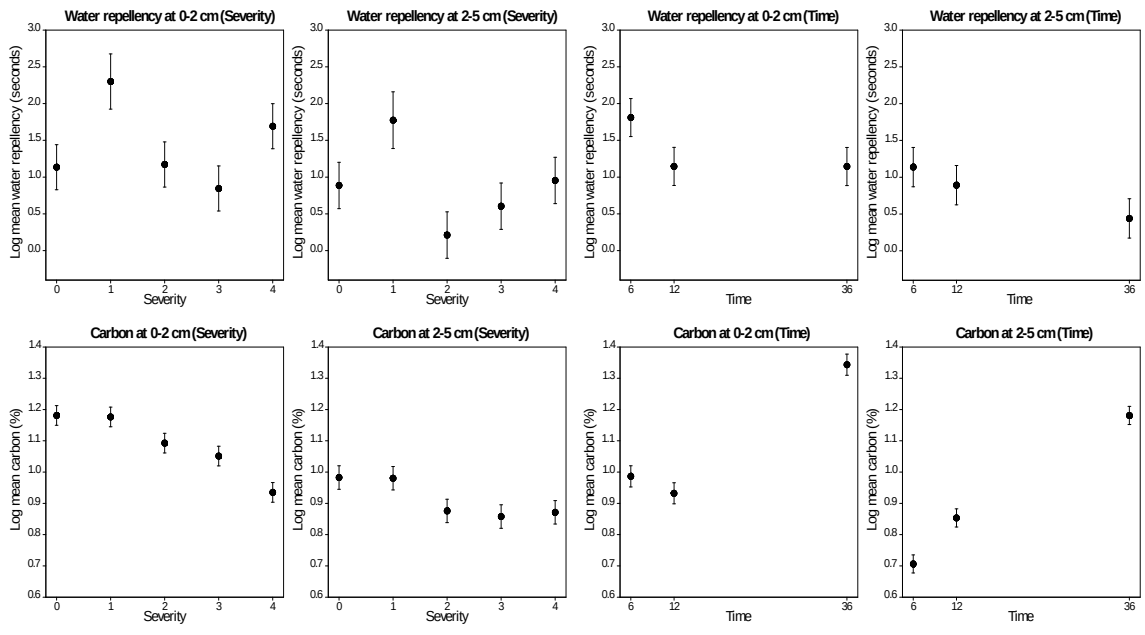
Fig. 2. Methods used in research project

Results and Conclusion

- A significant difference across burn severity levels occurred for both total carbon and repellency (Table 1)
- Both total carbon and water repellency decline with higher burn severities (Fig. 3)
- A significant difference in carbon was present across time at Wentworth Falls (Table 1)
- Carbon could be assessed further in detail i.e. labile carbon

Table. 1. P-values for carbon and water repellency

Study site	Test	Depth (cm)	Time	Severity	Time.Severity
Cranebrook	Carbon percentage	0-2	0.389	<0.01*	0.965
Cranebrook	Carbon percentage	2-5	0.375	<0.01*	0.958
Wentworth Falls	Carbon percentage	0-2	<0.01*	<0.01*	0.3.80
Wentworth Falls	Carbon percentage	2-5	<0.01*	0.046*	0.999
Cranebrook	Water repellency	0-2	0.066	0.021*	0.179
Cranebrook	Water repellency	2-5	0.164	0.059**	0.685
Wentworth Falls	Water repellency	0-2	0.221	0.001*	0.947
Wentworth Falls	Water repellency	2-5	0.146	0.03*	0.885



0= unburnt; 1= low; 2= moderate; 3= high; 4= very high

Fig. 3. An example of the carbon and water repellency response at Cranebrook according to burn severity and time as independent factors.

Reference

DeBano, L.F., Neary, D.G., Ffolliott, P.F., 1998. Fire's effects on ecosystems. John Wiley & Sons Inc.

End User Statement:

These data will be incorporated into the SCA's fire management strategies and planning processes. It is particularly important for the SCA to understand how wildfire impacts soil structure and how these changes have the potential to enhance the possibility of increased soil erosion during a heavy post-wildfire rainfall event. Chris Chafer SCA.