

INDEPENDENT BUSHFIRE GROUP

Fire Study 4: Gaspers Mountain fire, Glow Worm Tunnel Road backburn

Issue: Backburn Failure because of timing of light-up under SW dry air mass

Period: 7 – 11 December 2019

Introduction

The purpose of this fire study is to analyse why the eastern backburn on the Newnes Plateau failed on the evening of 7 December and why the timing of the backburn was critical to the potential containment of the Gaspers Mountain bushfire. See map *Figure FS15* for details of fire spread and fire impacts.

Situation

A 17 km length backburn was conducted between the old Newnes pine plantation and the northern end of the Newnes plateau during the late evening of 7 December between approximately 19:00 and 23:00.

Fire Weather Patterns (*Figure FS16*)

- The backburn was conducted when there was a very dry air mass (dewpoint temperature less than 3-10 °C) over the fire ground on 7 December resulting in DFMCs decreasing to 4-5% late into the evening of 7 December when a moister ENE airmass broke through the WSW dry air mass
- There was a highly unstable turbulent middle level atmosphere aloft.
- The burn was conducted under high to very high FFDIs.
- Had the burn been conducted a day or two later, if possible, then it would have been within planned burned prescriptions when DFMCs were between 13 and 20%, under stable north-easterly winds between 15-20 km/h.

Sequence of events

- This long backburn was commenced on the evening of 7 December to contain the westward advance of the Gaspers Mountain fire which, according to information available for this analysis, was at that stage 4-5 km away and spreading at 500-700 m/day in a westerly direction.
- The backburn linked at the north end to a successful containment line extending northwards to Glen Davis and beyond (*see Fire Study 3 for details*).
- The southern extension of the proposed backburn containment line is unknown. The plan may have been to extend the backburn into Bungleboori Creek (on the southern edge of the map).
- Once lit, the backburn spread successfully and rapidly to the east, initially under the influence of a dry westerly wind.
- At some point during the night, and possibly owing to the easterly wind change, the backburn crossed the containment line to the west and was not contained.
- The escape may have occurred after the wind changed to the east and before humidity increased. Information from the fireground has also suggested the escape may have been caused by inappropriate light-up methods.
- By 0800 the next morning (8 December) the crossover was some 5 km in length.
- The escaped burn continued westward to a subsequent attempted containment line/backburn on Maiyingu Marragu (Blackfellows Hand) Trail, which also failed.

Containment strategies

- The backburn was a valid response to the situation at the time. If it had succeeded (and been extended southwards) it would have prevented the fire burning a very large area to the west and south and impacting several communities.
- The reasons for the backburn escaping are unclear and require detailed analysis with more information, especially from firefighters on the ground.
- It is also unclear as to what fire advantages it was going to be tied into to the south.
- Our analysis shows that there was a high-severity zone to the east of the backburn containment line. Based on fire weather at Marrangaroo (15-22 km SW of the backburn containment line) the backburn would have created high-severity fire to burn through Sydney Peppermint-Silvertop Ash dry shrubby forest fuel type under the very dry air mass conditions.
- The intense burning conditions under more or less severe wildfire conditions created intense pyro-convection over the fire ground which usually results in unstable and erratic fire behaviour and even drier and stronger middle-level atmospheric winds to interact with the backburn. The backburn in effect created a high-severity wildfire. The results were detected on the radar at Sydney over 100 km away *Figure FS17*.
- The three-day period after 10 December were more suited to less intense backburns under milder fire weather conditions.

Post fire impacts

- Because the Glow Worm Tunnel Road backburn created high fire-severity effects on the plateau forest to the east of the Glow Worm Tunnel Road (*see dark brown burn patterns in Figure FS15*), the forests' recovery is likely to be slow because of the drought stress on the trees and understorey at the time.
- Severe thunderstorms on 8 and 10 February produced over 350 mm of intense rainfall that would have impacted on the surface soils and created massive soil movement and loss in that fire landscape.

Potential lessons

- Backburns need to be timed and implemented during periods of stable easterly fire weather with higher dead fine fuel moisture content and 10-m wind speeds. Timing of backburns in relation to weather and fuel conditions is critical.
- Sometimes it is better to observe and carefully consider the options rather than losing a backburn or creating high severity fire behaviour. In this case the intense fires created pyro-cumulus clouds as seen late evening on the Sydney radar (*Figure FS17 (a), (b), and (c)*). Lighting up a backburn with a high-severity fire was also outside RFS SOP 17 guidelines.
- Anchor points as part of a partial containment strategy need to be considered early on the western and southern sectors of a bushfire, particularly in its early stages. The Gospers Mountain fire was allowed to cross key fire advantages such as the Colo River and the Wollemi Creek and take high-severity fire runs unchecked for most of its duration. This backburn strategy could have been a late in the day key anchor point had it been implemented with due concern for the local environment and nature conservation values.
- There is a distinct difference between the air masses in the western and eastern Blue Mountains on most severe fire days. The fire weather in the upper Blue Mountains is often drier and windier with dewpoints falling to below 0°C much earlier in the day and remaining so until late in the evening.

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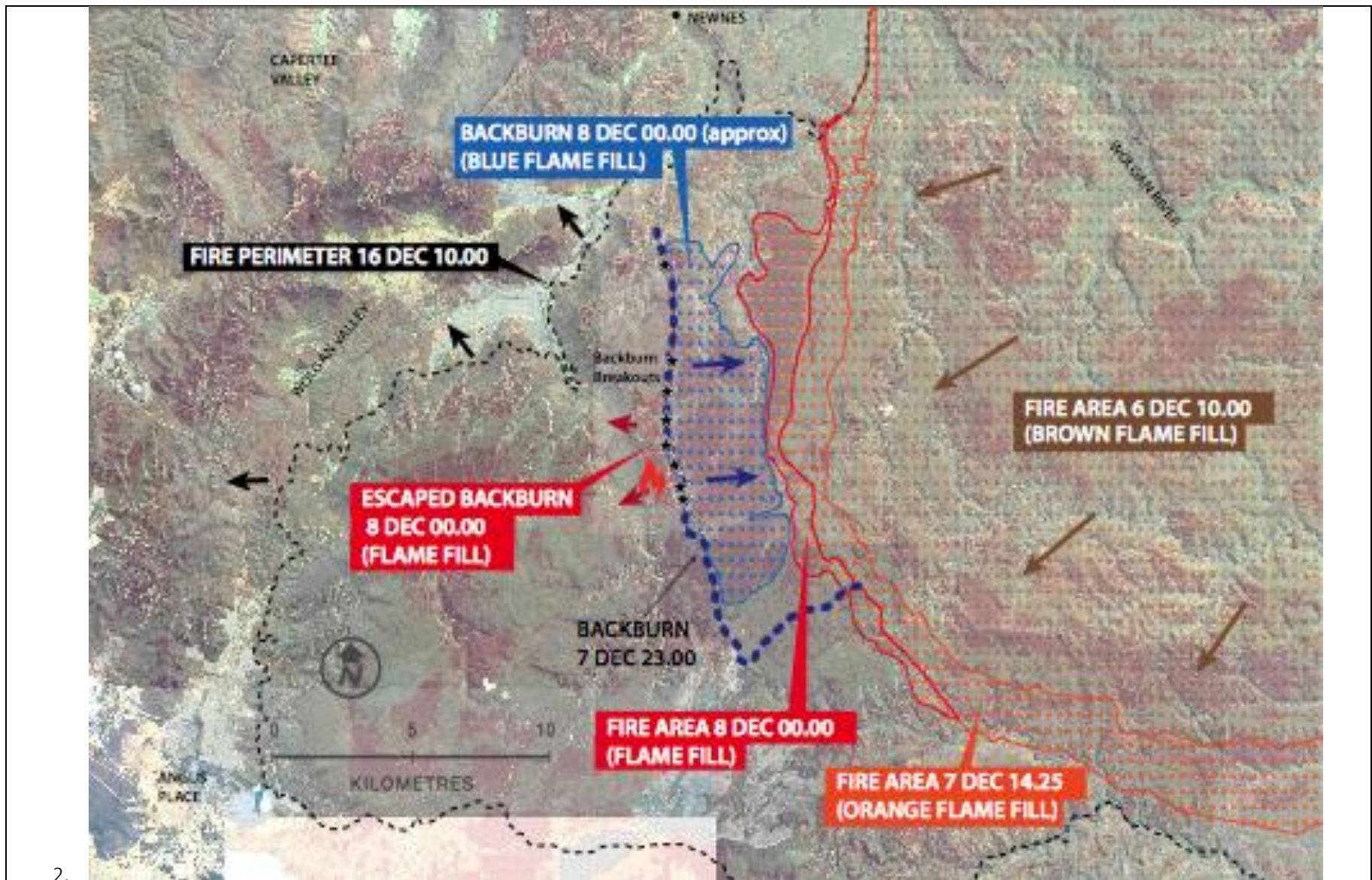


Figure FS15: Progression of Glow Worm Tunnel Road backburn and associated front of Gospers Mountain wildfire 6-16 December 2019.

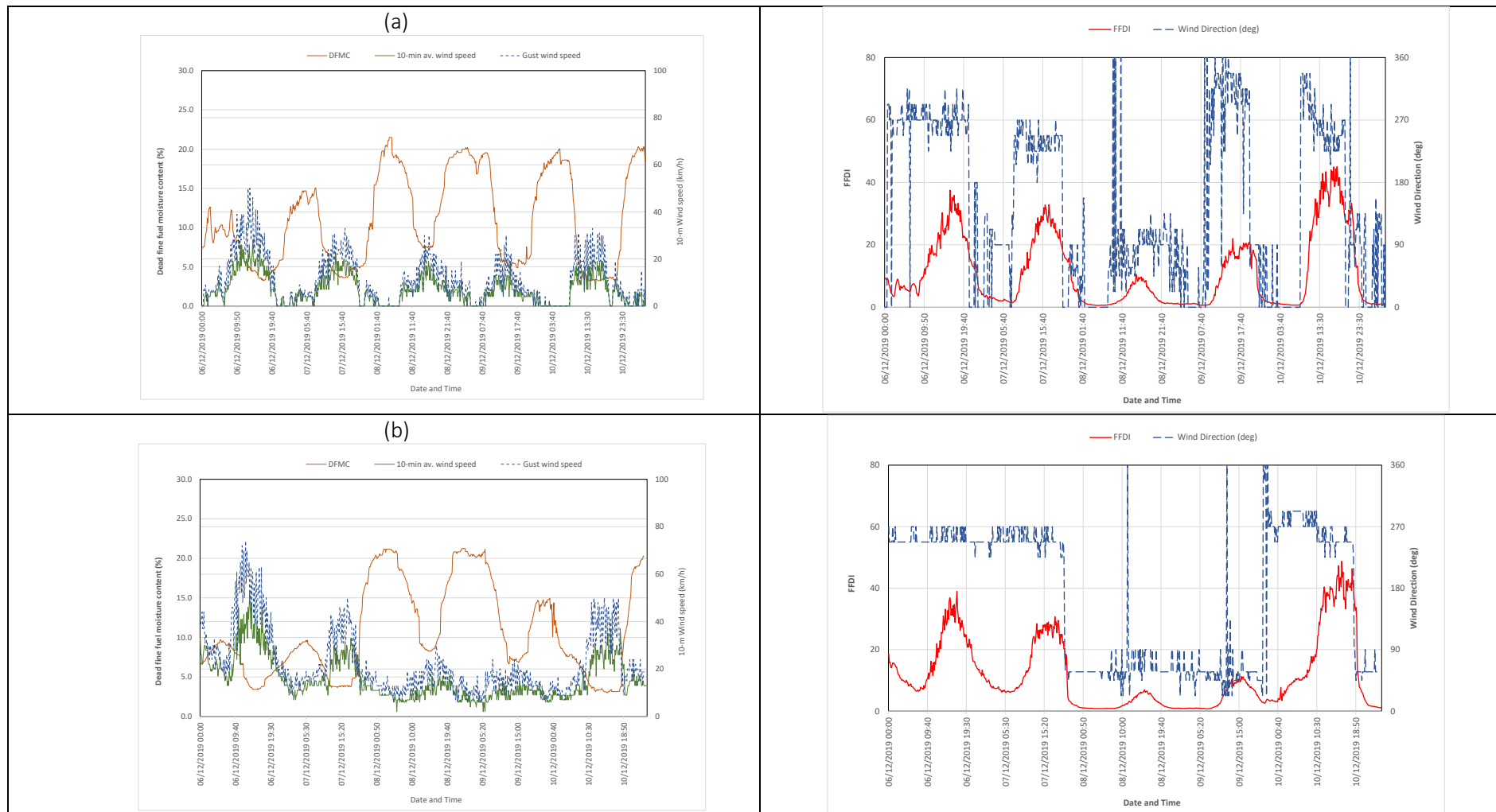


Figure FS16: Fire Weather (DFMC and 10-m wind speeds 1st column) (FFDI and wind direction 2nd column) – 6 Dec to 10 Dec 2019 – (a) Marrangaroo AWS north of Lithgow (first row) and (b) Mt Boyce AWS (second row).

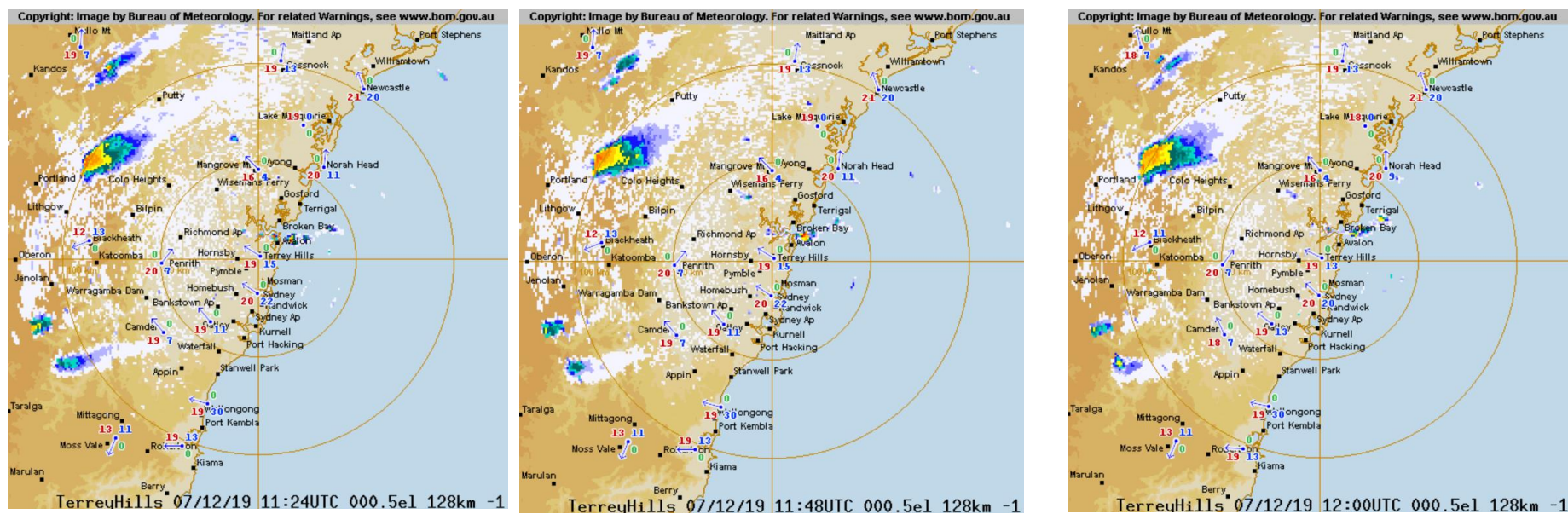


Figure FS17: Radar Images from Sydney Radar (a) 22:24; (b) 22:48: and 23:00 07 Dec 2019 AEST showing pyro-cumulus clouds (main plume between Portland and Putty) forming over the Glow Worm Tunnel Road backbone at the time of possible coalescence of backbone with the Gospers Mountain bushfire.

Source: Bureau of Meteorology

Fire Study Author

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Nicholas Gellie is a landscape ecologist and fire scientist with 37 years' experience in fire management, fire research, fire ecology, fire risk planning and vegetation mapping. He has an in-depth knowledge of landscape and bushfire processes in south-east Australia, having reconstructed over 100 major bushfires, including 2003, 2007 and 2009 (Black Saturday) in Victoria, 2003 in Canberra and 2019-2020 in NSW, as well as in Portugal and in California. He has undertaken many consultancies and published many scientific papers. He has worked extensively on fire behaviour analyses and the effectiveness of planned burning programs. He was a pioneer of community fire planning in NSW, has been involved in suppression strategies and aerial ignition for numerous wildfires and has planned and implemented many prescribed burns. From 2009 to 2014 he worked with Victoria's Department of Sustainability of Environment and the Bushfire CRC on analysing the Black Saturday fires. He was a key consultant to the House of Representatives Select Committee's inquiry into the 2003 Australian bushfires, *A Nation Charred*.