INDEPENDENTBUSHFIREGROUP

Fire Study 7: Currowan-Tianjara Complex

Issue: Strategic containment in early stages of fire

Period: 27 November – 1 Dec 2019

Introduction

The purpose of this fire study is to review the containment of the Currowan bushfire in its early stages based on a strategic focus.

As mentioned in the Fire Studies Introduction, access to IAP maps, photographs, and other resources stored on the RFS's Icon web platform would have added considerable accuracy and depth to our analysis.

See map *Figure FS13*.

Situation

Important fire landscape features

- Fire was located in the Clyde River basin below the Budawang ranges about 20 -30 km inland from the coast.
- In this area there is a mosaic of eucalypt heathy woodland, eucalypt semi-mesic forests, and rainforests, becoming more mesic near the coast near Termeil and in Kioloa National Park.
- There have been very few wild or prescribed fires in Currowan State Forest in the past 20-30 years resulting in higher than-average surface fuel loads and possibly a more open heathy understorey.

Seasonal dryness indicators

- Based on the Braidwood SWD charts presented in *Figure FS7*, this part of the South Coast had depleted soil moisture reserves from two years of below-average rainfall. The dry eucalypt forest types in this area were likely stressed from very high soil water deficits (SWD). The semi-mesic forests and rainforests were also likely more flammable and combustible under these prolonged drought conditions.

Fire weather patterns (see weather charts Figures FS22 and Figure FS23)

- There were two distinct air masses overlying the Currowan bushfire in its early stages of development. The first is the westerly dry and warm air mass detected at the Braidwood AWS and the second is the east to northerly-easterly cool and moist air mass detected along the coast at the Ulladulla AWS. These two systems competed during this period and influenced the pattern of spread in the fire's early stages.
- The lightning ignition accompanied thunderstorms with the passage of a pre-frontal trough. The fire spread quickly to the east under very high fire danger indices of between 35 and 45.
- During the period of the backburns between 27 and 30 December, the fire weather conditions possibly made it difficult to implement the backburns effectively because of the competition between the two air mass systems. The westerly dry and turbulent air mass would have made it at times too dry to burn sometimes in the afternoon and then too moist for the burns to get substantial depth overnight. There was possibly wide variation in DFMC between day and night during this period.

- Being on the lee side of the Budawang Ranges escarpment, the Currowan bushfire was exposed to the lee wave effect which exacerbated the spread of the bushfire on 2, 3, and 4 December. This is where the bushfire's convection column entrains even drier air and turbulent air masses from middle level winds that reach the fireground having come over the South Coast escarpment. This possibly explains the faster rate of spread of the Currowan bushfire on these otherwise less severe fire weather days. The FFDI was comparatively much lower at both the Braidwood and the Ulladulla weather stations.
- The actual weather on the fireground is therefore difficult to interpret accurately from the very different fire weather patterns detected at the tablelands station at Braidwood and the coastal weather station at Ulladulla.

Containment strategies

- Broad area containment using backburning was applied early on with the Currowan bushfire to halt its westerly spread from late on 27 December till late afternoon on 28 December. These were carried out mainly in Silvertop Ash heathy woodland and forest along the wind-exposed spines of the ridges. This creates a high propensity to produce short-range spotting under low to very low DFMCs because of the Silvertop Ash bark.
- These early backburns were extended well to the north, about 5 km past the immediate westerly fire flank of the Currowan bushfires. While this intended tactic halted the westerly spread of the bushfire, both the southern parts of the backburn and its northerly extension had significant spot-overs later on 28 December which burnt apparently uncontained.
- The resultant effect of these backburn escapes is that there were no significant fire advantages left to backburn from, in the steep slopes leading up over the Budawang Range escarpment. As it spread westwards after 1 December, it meant that the fire would become more and more exposed to the influence of the dry and unstable hot airmass high up on the ranges.
- The northerly backburns were 8-9 km off the bushfire's northern flank on the afternoon of 29 November. The fire had spread northwards averaging 0.8-1.0 km per day since the afternoon of 27 December about 1.5 – 2 km north from where it was on the evening. A considerable gap remained between the backburn and the main fire.
- The eastern and southern sectors had no clearly identifiable fire advantages. The easterly flank and separate spot fire could have been brought down together to the Clyde River using judicious aerial ignition and close-in tactical burns during late evening of 27 or 28 November to limit the fire's potential to spot over the Clyde River.
- Spotting did occur across the Clyde River sometime on 30 November which was subsequently contained by the morning of 1 December. Unfortunately, this spot fire broke its containment lines later and proceeded to run on 2 and 3 December across the Princes Highway and into Kioloa National Park *(see map Figure FS24)*.
- The backburn extension to the north increased the likely exposure risk of further fire runs to the coast and breakouts to the north and west which did occur later on 4 December. There was over 40 km or more of containment line perimeter to be mopped and patrolled. If there was a scarcity of firefighting resources for mop up and patrol, this backburn strategy could have been reconsidered and possibly an alternative partial containment fire strategy used from the start of the bushfire.
- The Sentinel image on 1 December suggests that no coherent tactics and strategies for a partial containment strategy were applied.

Potential lessons

- As a broad fire strategy, the overall early aim could have been to keep the fire contained under the coastal influence of easterly air masses. The most critical anchor points for this stage of the bushfire were the westerly fire trails used as backburn lines. This was lost very early on 28 November, a day later, which meant that the fire then went on to increase in size largely unchecked to the north and west over the next 40 days and become a 500,000-ha bushfire.
- From the start of this bushfire, tactical rather than broad area backburning could have been applied on most of the flanks to check its easterly and southerly spread. Those flanks are where future fire runs could and did come from later on 2 and 3 December from spot fires already on the eastern side of the Clyde River.
- Large scale backburns involving lengthy fire perimeters have had a history of failing when fire weather conditions deteriorate. The classic case of the 2003 Canberra bushfires involved several different backburning operations which all failed the day before 18 January 2003. The combined effects of these operations caused a massive pyro-cumulonimbus cloud to form from several high-severity fires converging in the mid-afternoon in the Cotter catchment.
- Thorough mop-up and patrol of backburns are essential to success and need time to implement before any significant deterioration in fire weather conditions. In some cases, a three-day lead time before a significant fire weather event may be needed to limit possible reignitions and spot-overs.
- A watch-out for the lee-wave effect of middle level dry air masses descending on the lee side of mountain ranges should be carefully considered along the length of the NSW coast and hinterland. This has been observed and modelled for Victorian bushfires occurring in central and eastern Gippsland (eg Aberfeldy-Donnellys bushfire in February 2013).

Map notes *(Figure FS24)*

- Backburning commenced in the western sector of the Currowan fire overnight on 27 November along roads in its western sector to contain the westerly spread of the Currowan bushfire.
- On 28 November the westerly backburns had spotted over in several places.
- Further backburns were conducted in the northern sector on or before 29 November on fire trails 8-9 km north of the northern flank of the Currowan bushfire.
- By 30 November there were still many gaps in the overall fire strategy on the eastern and southern flanks of the Currowan bushfire.
- A spot-over on the eastern side of the Clyde River occurred on 30 November was contained with a backburn overnight on 1 December. This subsequently escaped and caused a major fire run through Kioloa State Forest into Bawley Point on 2 and 3 December.
- A second spot fire crossed the Clyde River on 1 December to the south of the first spot fire. It was detected on the Sentinel image on 1 December at about 11:00 am.
- These two spot fires then commenced fire runs towards the Coast on 2 and 3 December.
- A further fire run commenced towards Termeil on 4 December from a breakout from backburns well to the north of the original bushfire extent on 27 November.

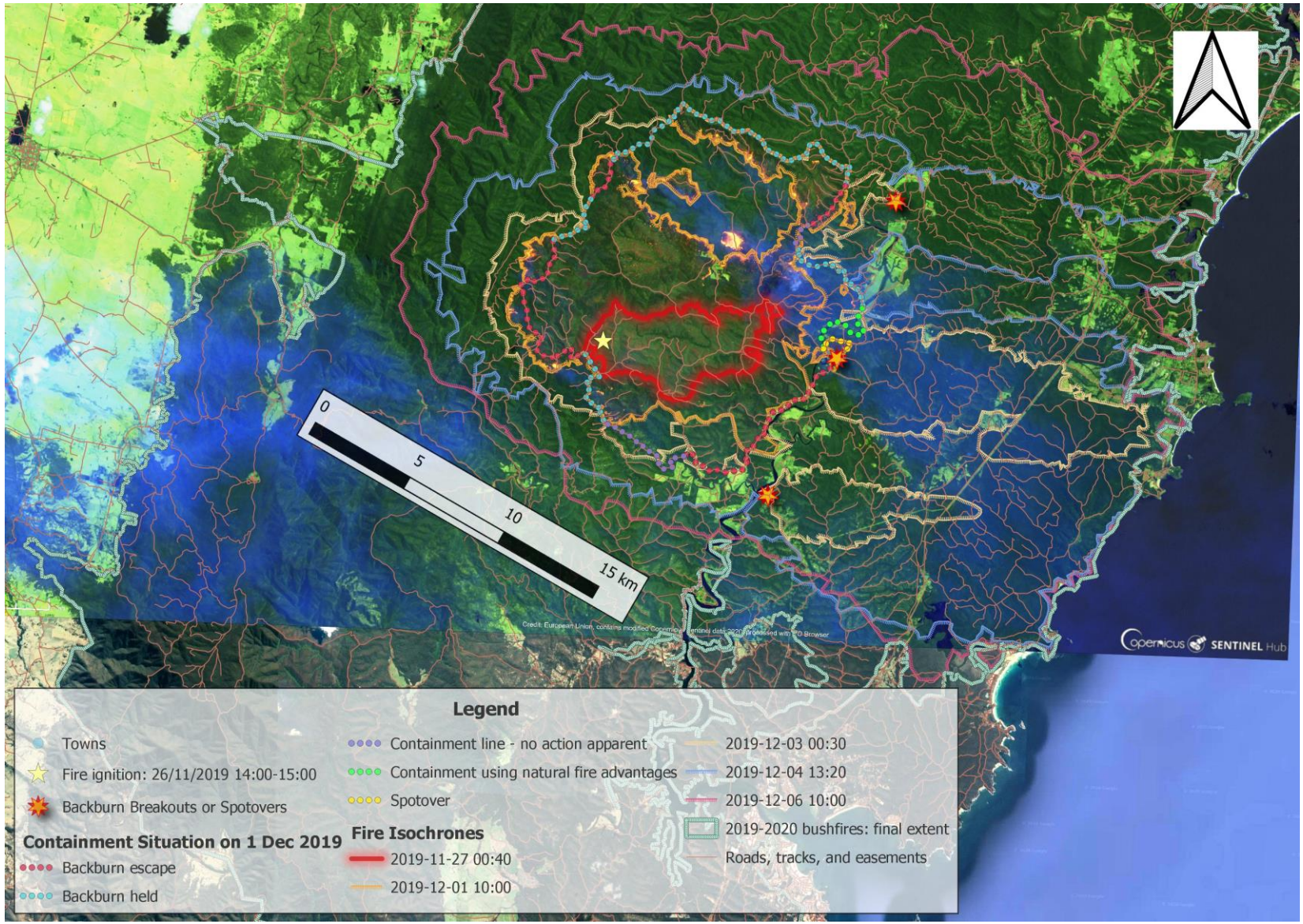

Figure FS24: Fire Containment strategy overview map for the early stages of the Currowan bushfire

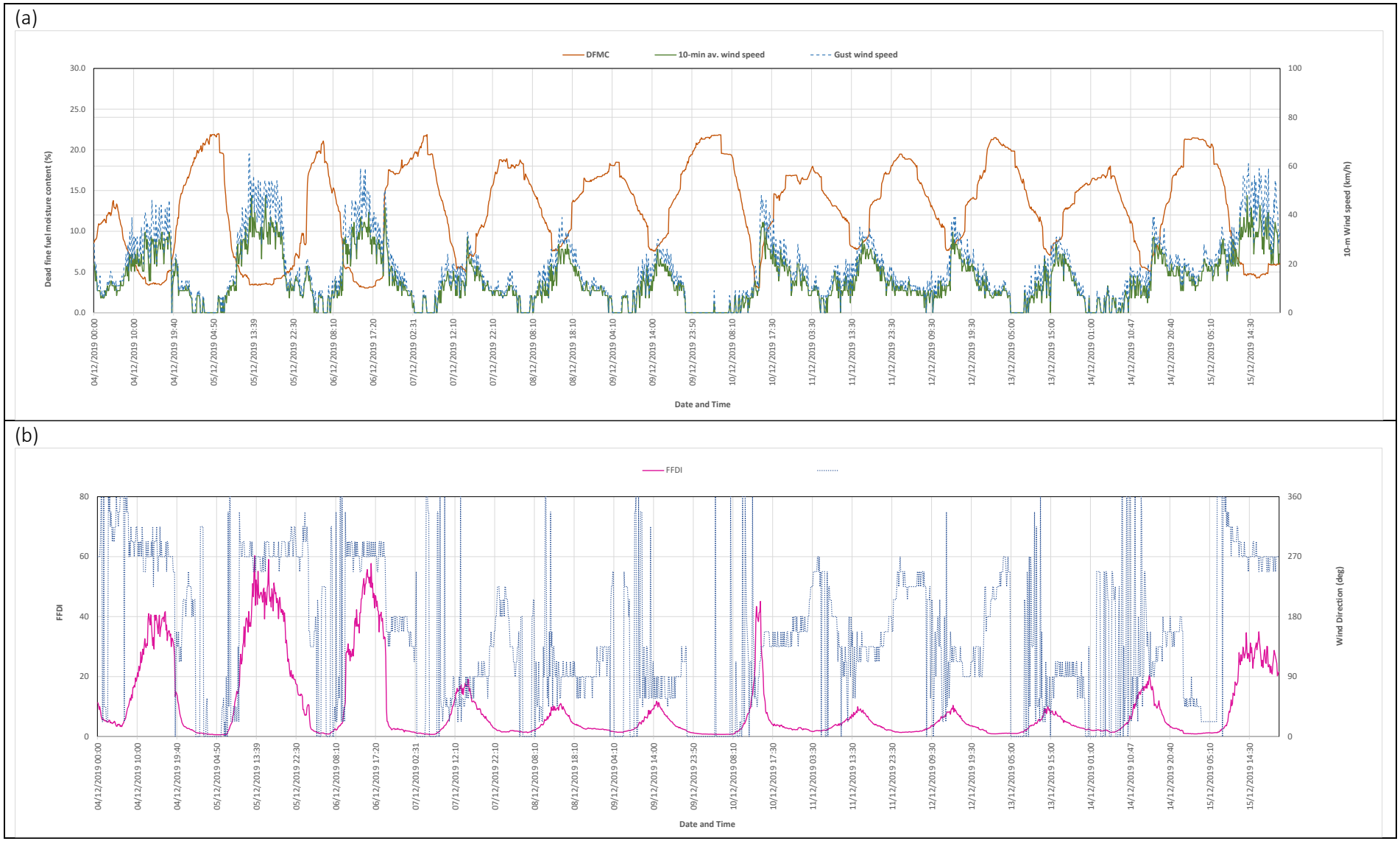

Figure FS10: Fire Weather – Top panel (a) (DFMC and 10-m wind speeds) and bottom panel (b) (FFDI and Wind Direction) for Moss Vale AWS, 4-15 Dec 2019

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*.