



## **Appendix A – The 2002–2003 fire season**

On January 8 2003, lightning strikes from a severe electrical storm sparked 87 fires in the drought affected landscape of north-east Victoria and 60 fires in southern New South Wales and the adjoining areas of the Australian Capital Territory.<sup>1</sup> Over the coming weeks, these fires spread rapidly, behaving in ways not previously seen,<sup>2</sup> eventually merging into one continuous line spanning an area of 1.7 million hectares.<sup>3</sup>

### **The link between meteorology and bushfires**

There is a strong link between weather and climatic patterns and the behaviour of bushfires therefore, a detailed understanding of Australia's meteorology is critical in bushfire risk assessment and developing effective suppression strategies.<sup>4</sup> The typically hot and dry climate over summer in the south east states of Australia is conducive to the ignition of bushfires. Coupling this with undesirable weather conditions such as high winds and

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- 1 Nic Gellie, *Report on Causal Factors, Fuel Management, including Grazing, and Australian Incident Management Systems*, p. 12.
  - 2 National Parks Association of NSW, *Kosciuszko—and the burning issue of hazard reduction*, <http://www.npansw.org.au/web/journal/200304/features-fire.htm>, viewed 24 September 2003.
  - 3 National Parks Association of NSW, *Kosciuszko—and the burning issue of hazard reduction*, <http://www.npansw.org.au/web/journal/200304/features-fire.htm>, viewed 24 September 2003.
  - 4 Bruce Esplin, *Report of the Inquiry into the 2002–2003 Victorian Bushfires*, October 2003, p. xvi and the Bureau of Meteorology, *Submission no. 369*, p. 2.

drought, not only increases the risk of ignition, but facilitates rapid and uncontrolled spreading of bushfires.<sup>5</sup>

In the months preceding (and during) the recent bushfires, Australia's meteorological conditions were as follows.<sup>6</sup>

- Severe drought.
- Below normal atmospheric humidity and cloudiness.
- Unprecedented high daytime temperatures.

The above combination of factors resulted in severe moisture stress and an early curing of fuels across most of eastern Australia – conditions conducive to a severe fire season.<sup>7</sup> A similar combination of conditions existed in the months preceding (and during) the bushfire seasons of 1938-39 and 1982-83 where the severity is comparable to 2002-03.

## Australia's drought

The drought conditions experienced across Australia can be attributed to the following.

- El Nino – cyclic warming of the central and eastern Pacific Ocean that typically increases Australia's atmospheric pressures and daytime temperatures, decreases the country's winter-spring rainfall and precipitates delayed onset to the northern monsoon.<sup>8</sup> Most of Australia's severe droughts have occurred during El Nino events where severe fire conditions are more frequent.<sup>9</sup>
- Precipitation – rainfall plus the water equivalent of snowfall, where applicable.<sup>10</sup> From October to December 2003, precipitation in most of the south-eastern areas of Australia was well below average and had almost reached record-breaking low levels by the end of January.<sup>11</sup> This situation facilitated early curing of the (already dry) forest fuels and longevity of the fires (after their outbreak).

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5 Bureau of Meteorology, *Submission no. 369*, p. 2.

6 Bureau of Meteorology, *Submission no. 369*, p. 4.

7 Bureau of Meteorology, *Submission no. 369*, p. 4.

8 Bureau of Meteorology, *Submission no. 369*, p. 8.

9 Bureau of Meteorology, *Submission no. 369*, p. 8.

10 Bureau of Meteorology, *Submission no. 369*, p. 9.

11 Bureau of Meteorology, *Submission no. 369*, p. 9.

- Temperature – the year 2002 was the fifth warmest nationally since the commencement of records in 1911 and created heatwave conditions with many areas of southern Victorian experiencing temperatures in the range of 43-46 degrees celcius.<sup>12</sup>
- Evaporation – from April 2002 to January 2003, this was 5-20 per cent above average (where comparable data is available).

## Soil dryness and fire danger indexes

Mr Gellie, the Committee's consultant, undertook an analysis of long term climate records to identify historical trends in two key parameters in fire behaviour – Soil Dryness Index and Fire Danger Index. This is presented in detail in Appendix E.

This analysis shows that there have been twelve years out of a total of forty six where the soil dryness has exceeded 140 millimetres for more than forty days in a year. Prolonged periods of soil dryness in excess of 140 millimetres will lead to wilting of trees and shrubs, and curing of grasses, in native forests, and will tend to increase flammability and curing of live forest fuels. It is notable that the years in 1968 and 1998 had significantly greater number of days than that in 2003, exceeding 100 days in a year. The most recent fire season was comparable with previous years 1965, 1978, 1980, and 1983 and was not the worst dry period in the recent historical record as far as soil dryness was concerned.

An historical analysis of combined daily fire danger ratings and soil dryness was undertaken by the Committee's consultant, based on the Omeo and Canberra weather stations. The results of this trend analysis show that the number of days with high soil dryness index and fire danger exceeding 30 in 2002-03 was the third highest on record in Canberra, being exceeded in 1982-83, and 1997-98. Omeo has consistently fewer such days than Canberra. The frequency of such days was comparable with previous fire seasons, such as 1967-68, 1972-73, 1990-91, and similarly 1982-83 and 1997-98 had significantly more severe days. The data suggests that the occurrence of high to severe fire weather conditions in 2002-03 were comparable with those of previous fire years in both north eastern Victoria and south eastern New South Wales, perhaps being slightly higher than on an average drought year.

The analysis showed that the 2002-03 fire season had four days which exceeded a forest fire danger rating of 40, with some of the highest values of

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12 Bureau of Meteorology, *Submission no. 369*, p. 10.

forest fire danger and soil dryness. However a comparable number of peak fire days have occurred in previous fire seasons, in 1957-58, and 1982-83. The next most recent fire season in 1997-98 had six days in late January and February, where values of forest fire danger rating were between 40 and 60.

## **Spread of the fires**

The consultant prepared a map of the fire spread using Sentinel Hotspot data supplied by the CSIRO and an overlay of final fire perimeters derived from data published on the Victoria DSE's website and maps of New South Wales prepared by the RFS and NPWS. Although the accuracy of the consultant's map is approximate, it indicates the progressive build-up and eventual containment over a period of six weeks starting on January 2003.

Major breakouts of containment lines occurred on 17 January when the Forest Fire Danger rating was between 30 and 45 at elevations between 700 and 1200 metres. This fire spread continued the following day with the most the growth in areas of the Australian Capital Territory and in the Jagungal Geehi and Upper Murray precincts of Kosciuszko National Park. The next major breakout occurred on 26 January where the fire danger rating peaked at Omeo at 57 with separate fires in Victoria merging into one major complex. On the 30 January, the fire danger rating reached 78 in Omeo, the second worst on record. At this point, major spotfires were ignited from thunder clouds developed from the convection column activity. By 1 February the fire danger rating decreased, enabling containment lines in Victoria and southern New South Wales to be consolidated.<sup>13</sup>

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13 All information contained under this sub-heading was taken from Nic Gellie, *Report on Causal Factors, Fuel Management, including Grazing, and Australian Incident Management Systems*, pp. 13-14.

## Reported losses

The 2002-03 fire season was one of the most serious on record taking into account over three million hectares of land destroyed throughout the country (including Queensland, Tasmania and Western Australia).<sup>14</sup> The areas burnt in Victoria, New South Wales, the Australian Capital Territory, Western Australia and Tasmania made the fire season the most severe on record. The losses are outlined below.

### Victoria

In Victoria the bushfires resulted in 400 injured civilians, 36 lost homes (plus outbuildings), over 1,324,000 hectares of burnt land (including 108,000 of private land) and the loss of 2800 sheep, 850 cattle, stock and equipment.<sup>15</sup>

### New South Wales

The New South Wales fire season took three lives, approximately 86 residential homes (and damaged 28 homes and 188 outbuildings) and burnt 1,465,000 hectares of land including two-thirds of Kosciuszko National Park and 30,000 hectares of private lands and significant areas of the southern Alps.<sup>16</sup> Around 3400 stock was lost including horses, cattle and sheep plus a koala colony.<sup>17</sup>

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14 National Association of Forest Industries, *Facts and Figures: Bushfires*, <http://www.nafi.com.au/faq/index.php3?fact=10.htm>, viewed 24 September 2003.

15 Emergency Management Australia Database of Australian Disasters <http://www.ema.gov.au/ema/emaDisasters.nsf>, viewed 24 September 2003, National Association of Forest Industries, *Facts and Figures: Bushfires*, <http://www.nafi.com.au/faq/index.php3?fact=10.htm>, viewed 24 September 2003 and Bruce Esplin, *Report of the Inquiry into the 2002–2003 Victorian Bushfires*, October 2003, p. xvi.

16 National Parks Association of NSW, *Kosciuszko—and the burning issue of hazard reduction*, <http://www.npansw.org.au/web/journal/200304/features-fire.htm>, viewed 24 September 2003 and New South Wales Fire Brigades <http://www.nswfb.nsw.gov.au/index.asp?sectionid=361>, viewed 15 October 2003.

17 and New South Wales Fire Brigades <http://www.nswfb.nsw.gov.au/index.asp?sectionid=361>, viewed 15 October 2003.

## Australian Capital Territory

The fires and associated firestorm that reached suburban Canberra resulted in four deaths (plus injuries to civilians), loss of 501 houses (plus damage to over 300 houses), 160,000 hectares of burnt land (almost 70 per cent of the Australian Capital Territory) and major loss of government infrastructure and facilities including the Mount Stromlo Observatory.<sup>18</sup>

## Western Australia

In terms of area burnt, the south west area of Western Australia experienced its worst fire season since 1960-61<sup>19</sup> covering 133,000 hectares.<sup>20</sup> CALM stated that: 'As at 1 May 2003 ... fires ... covered 754,000 hectares of Crown lands and private property between Geraldton and Esperance.'<sup>21</sup>

No lives were lost in the south west fires and only 'a few houses and sheds'.<sup>22</sup> One volunteer fire fighter lost his life during a fire to the north of Perth.<sup>23</sup>

## Tasmania

Tasmania experienced 1500 vegetation fires that burnt a total of 52,000 hectares of land including 6000 hectares of state forest, 16,500 hectares of National Parks and reserves and 29,500 hectares of private property.<sup>24</sup> Six homes were lost (plus outbuildings), several hundred farm animals perished and the timber community lost 2000 hectares of pine plantation.<sup>25</sup>

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18 Ron McCleod, *Inquiry into the Operational Response to the January 2003 Bushfires in the ACT*, August 2003, p. 188.

19 Rick Sneeuwjagt, *Transcript of Evidence*, 6 August 2003, p. 75.

20 Western Australian Government, *Submission no. 362*, p. 5.

21 Western Australian Government, *Submission no. 362*, p. 5.

22 Western Australian Government, *Submission no. 362*, p. 8.

23 Western Australian Government, *Submission no. 362*, p. 10.

24 Forestry Tasmania, *Submission no. 172*, p. 2.

25 Forestry Tasmania, *Submission no. 172*, p. 2 and Emergency Management Australia <http://www.ema.gov.au/ema/emaDisasters.nsf>, viewed 25 September 2003