

TRUTH ABOUT BLACK SUMMER BUSHFIRES THAT INQUIRIES FAILED TO GRASP

John Cameron¹, 4th October 2023

1. Summary

Victoria's black summer bushfires burnt 1.8 million hectares and five lives were lost. Within the region of the fire only 0.6% per year of the forest was fuel reduced in the four previous years, well below 5% recommended by the Victorian Bushfire Royal Commission (VBRC). Also analysis showed that 81% of the fuel reduced coupes were too small to be effective, given expected fire intensity in old heavy fuels. Run length, rate of spread and maximum spotting distance were consistent with fires burning in old heavy fuels without strategic fuel reduced coupes of sufficient size and scope across the landscape and near ignitions.

Observed PyroCU/CB fire behaviour ('fire storms') on the 30th and 31st December was consistent with crowning fires in sclerophyll forests with about 20-25 t/ha of surface/near surface fuel.² PyroCU/CB activity impacts the fire ground with downdrafts and wind against prevailing surface wind plus lightning, both contributing to more widespread spot fires.

Four of the lightning strikes on 21st November that grew into significant bushfires, were not detected until 5 to 15 hours after daybreak, despite being quite large when detected. This is surprising given early detection options including dawn fire spotting flights or predawn flights with heat sensing technology.

Initial attack was also much delayed resulting in an unacceptable 37% failure rate, despite the 3pm Forest Fire Danger Index being below 30 (at KBDI 100) for the first 18 days following the 21st November ignitions.

These relatively mild conditions were conducive to effective suppression, particularly given fire intensity would have been lower on the fire flanks and FFDI lower early in the morning and late in the afternoon.

Two fires where initial attack was delayed until the second and third day (Tambo 35, Tambo 38 & 39) grew to become the largest of four 'Tambo' fires. First attack on the Tambo 38 & 39 fire was not only delayed for three days, but grossly under resourced. This fire was joined by others to become the 'Tambo Complex' and 'Snowy Complex' fires that burnt almost 1.0 million hectares. At the time of the ignitions on 21st November, firefighters and equipment available for first attack were not stretched, however, deployment was considerably compromised. There is a *"prominent view that fires were left unattended and no significant effort was paid towards containing fires early to reduce the likelihood of them getting away."*

CFA volunteers reported time wasted on centralised briefings and too much 9 to 5 firefighting. Victoria compromised all four mantra of the NSW Volunteer Fire Fighters Association - **Land Management, Early Detection, Access, and Suppression**. The Howitt Society concluded *"The Inspector General for Emergency Management (IGEM) failed to fully cover the requirements of and report on any shortcomings in the government's fully addressing the requirements of section 5 of the Emergency Management Act"*, and the requirement to *"minimize the likelihood, effect and consequences of emergencies"*

2. Enormous damage caused by Victoria's 2019-20 bushfires

The Victorian Black Summer bushfires of 2019-20 killed five people, burnt 1.8 million hectares, 739 homes, 478 sheds, 5,153 livestock (**Table 1**) and millions of native fauna. Most of the burnt area was public native forest managed by DELWP (now DEECA) and Parks Victoria. Predominant vegetation was dry sclerophyll forest, along with smaller areas of cool, moist temperate forest and warm temperate rainforest.

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² David Packham OAM pers comm.

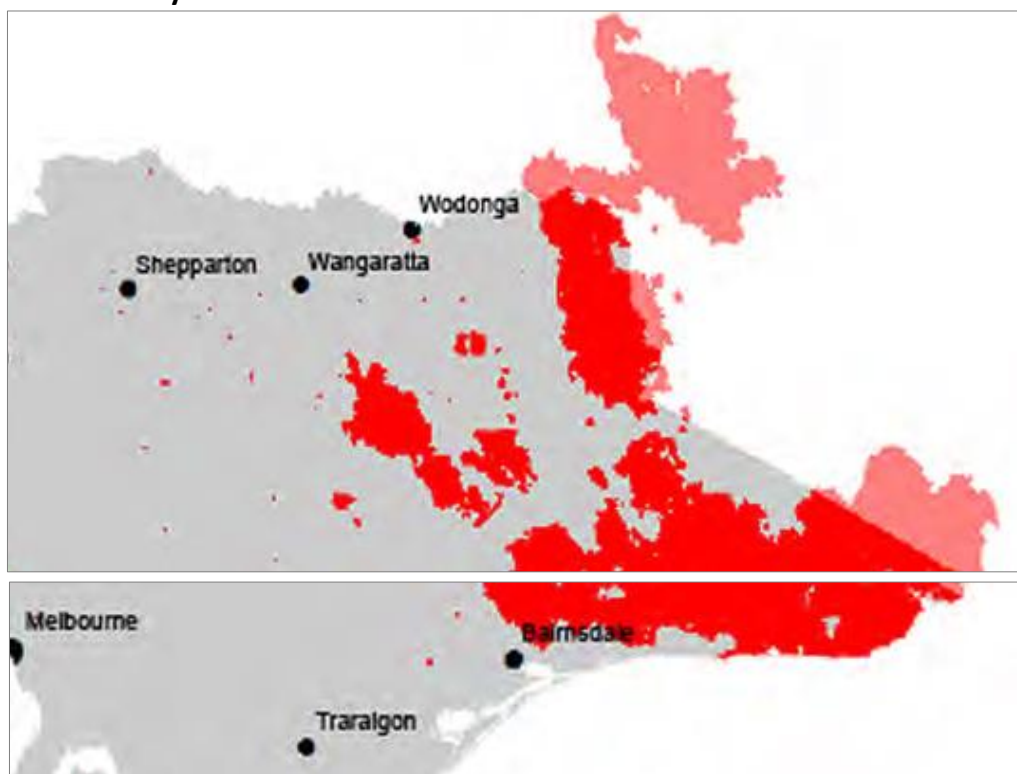
Table 1: Enormous damage caused by Victoria’s Black Summer bushfires³

Item	Gippsland	North East & Alpine	Other Vic	NSW	Total Vic
Fatalities (No)	4	1			5
Area burnt (ha)	1,163,248	319,401	25,246	332,500	1,840,395
Farmland burnt (ha)	16,858	19,839			36,697
Plantations (ha)	10	821			831
Hay & Silage (tonnes)	2,231	926			3,157
Houses destroyed or damaged (No)	550	189			739
Sheds destroyed or damaged (No)	232	246			478
Livestock destroyed (No)	1,103	4,050			5,153

FOOTNOTES: Major fires included Snowy complex 664,252 ha, Tambo Complex 324,738 ha, Upper Murray 26 - U Murray Walwa 200,442 ha, Ovens 41 - Abyyard 105,910 ha, Tambo - Buenba 90,003 ha, Tambo - Shanonvale 44,308 ha & Macalaster - Hotham Heights 35,650 ha

Most loss was in Gippsland along with 0.35 million hectares in the North East and 0.33 million hectares in NSW after the Victorian fires crossed the border. (**Figure 1**).

Figure 1: Area Burnt by Black Summer bushfires in Eastern Victoria in 2019-20³



3. Prescribed burning and bushfire mitigation were inadequate

An analysis of prescribed burning in the region over four years prior to the 2019-20 Black Summer bushfire show that the proportion of the forest fuel reduced was only 0.6% (one ninth of the 5% recommended by the VBRC). Also 81% of the fuel reduced coupes were too small, such that even moderate spotting would easily clear them (**Table 2**). Maps show too little fuel reduction close to the points of ignition, such that the resultant fires could burn for 10-50km before meeting a recently fuel reduced coupe. Friends of Mallacoota Inc also called for more fuel reduction that protects towns and communities.⁴ Communities and forest ecosystems are best protected by fuel reduced close to sources of ignition which may be over 50 km away from Communities.

³ Derived from IGEM (2020). Inquiry into the Victorian 2019-20 fire season. Phase 1 Report.

⁴ Friends of Mallacoota (2020). Submission to the IGEM Bushfire Enquiry. April 2020.

Table 2: Prescribed burns four years prior that were impacted by Black Summer bushfires⁵

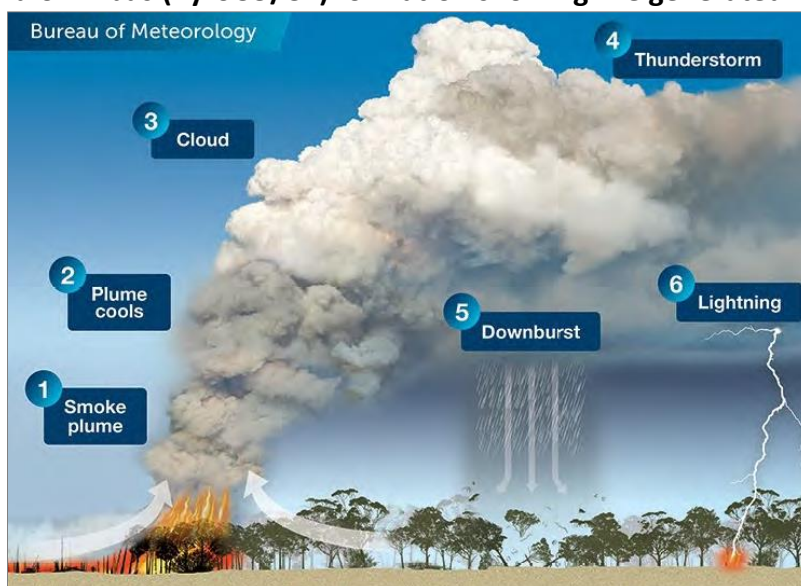
Prescribed burn size (ha)	Probable effectiveness of prescribed burning w.r.t. 2019-20 bushfire	Prescribed burns (No)	Proportion of burns (%)	Total area 2016-19 (ha)	Average area (ha)	Proportion of forest (% pa)
Total <1000	Ineffective coupe size	86	81%	24,104	280	0.23%
Total >1000	Effective coupe size	20	19%	34,930	1,747	0.34%
Total/Mean over four years 2016-2019		106	100%	59,034	557	0.57%
Total/Mean per year		26.5		14,759		0.57%

FOOTNOTE: Proportion of public forest is proportion of Tambo, East Gippsland and North East Forest Management Areas

A key point to make is that prescribed burns should be ‘cool burns’ at low fire intensity (white not black smoke). They should not cause too much canopy scorch and only burn 70% to 90% of the coupe. This generally requires igniting points rather than lines and completing the coupe may take two or three visits.

Observed PyroCU/CB fire storm behaviour on the 30th and 31st December was consistent with fires burning in heavy fuel. Surface/near surface fuel of 25 t/ha is equivalent to 9,000 litres/hectare of petrol (based on comparable heat of combustion). PyroCU/CB occurs when the fire intensity is high enough (about 10 MW/m) to add 2.0 to 2.5 degrees C to the smoke column and is typically associated with crowning fires in sclerophyll forests with about 20-25 t/ha of surface/near surface fuel.⁶ PyroCU/CB activity impacts the fire ground with downdrafts and wind against prevailing surface wind plus lightning. Both contribute to more widespread spot fires (**Figure 2**). Strategic fuel reduction is a practical way to reduce the impact of PyroCU/CB fire storm activity. Action on climate change will deliver virtue but no material impact on fire behaviour over the next few hundred years.

Figure 2: Pyro cumulonimbus (PyroCU/CB) formation showing fire generated wind and lightning³



The observed run length, rate of spread and maximum spotting distance are consistent with fires burning in old heavy fuels, without strategic fuel reduced areas of sufficient size and scope across the landscape, including fuel reduced areas close to points of ignition (**Table 3**).

⁵ Derived from Owen Salkin 2022. Victorian bushfire case studies. Preliminary reconstruction of the eastern Victorian Black Summer Fires, November 2019 – February 2020. BNHCRC Sep 2022.

⁶ David Packham OAM pers comm.

Table 3: Fire behaviour on 30 & 31 December 2019 are consistent with fires in old heavy fuels⁵

Fire No	Fire name	Run length (km)	Run time (hrs)	Rate of Spread (km/hr)	Maximum Spotting distance (km)
1 & 13	Sarsfield/Clifton Creek	22	6	3.6	8
2	Angora Range				24
3	Reedy Flat/Holstons	7.5	2.3	3.2	0 (mainly grass)
4 & 14	Buchan Sth to Wairewa	17	9	1.9	
5	Buchan	25	6	4.2	
6	Seldom Seen	25	12	2.1	5.5
7	Mt Stradbroke	9			
8	Snowy River to Orbost	28	10	2.8	5
9	Yalmy to Cann River	50	18	2.7	15
11, 12 & 18	Wingan to Mallacoota	25	20	1.2	

4. Delayed fire detection

Overnight lightning was responsible for the initial Tambo fires that grew into the ‘Tambo Complex’ and ‘Snowy Complex’ fires – total area burnt 989,000 ha. Four of these lightning strikes were not detected until 5 to 15 hours after daybreak (**Table 4**). This is surprising given early detection options including dawn fire spotting flights or predawn flights with heat sensing technology.⁷

Table 4: Detection time and hours since daybreak of Tambo fires on 22 November 2019

Fires ignited by lightning on evening of 21 Nov & detected on 22 Nov 2019	Detection Time	Time since daybreak (hrs)
Tambo 31 - Bruthen – Six Mile	0855hrs	5.2
Tambo 35 - Barmouth Spur - Marthavale	1035hrs	8.2
Tambo 38 & 39, W Tree Yalmy	1208hrs	11.1
Tambo 41 - Ensay - Ferntree Creek	1435hrs	14.8

5. Compromised initial attack

Over the last two decades many fires in public forest have got away and become megafires or campaign fires. With the 2019-20 bushfires there is a “prominent view that fires were left unattended and no significant effort was paid towards containing fires early to reduce the likelihood of them getting away”.³ Data in **Table 5** is consistent with this prominent view, where 37% of the 21/11/19 ignitions were not contained by first attack despite the 3 pm FFDI being below 30 for 18 days following ignition (**Figure 3**).

Table 5: Ignitions and proportion of fires not contained by first attack in 2019-20 bushfires³

Date	Ignitions (No)	Safe - overrun by fire (No)	Contained first attack		Not contained first attack	
			(No)	(%)	(No)	(%)
5-6 Nov	36		36	100%		
20-21 Nov	69	17	33	48%	19	37%
20-21 Dec	43		34	79%	19	44%
30-31 Dec	92	29	57	62%	12	19%

With four of the initial Tambo fires, one fire was attacked on day one, while another fire not until day two and another fire not until day three **Table 6**. **The first attack on the Tambo 38 & 39 fire was not only delayed for three days but grossly under resourced. This fire was joined by others to become the ‘Tambo Complex’ and ‘Snowy Complex’ fires that burnt almost 1.00 million hectares.**

⁷ Wight, G (2020). Proposal for improved early bushfire detection and rapid suppression. Royal Comm into National Natural Disaster Arrangements.

Table 6: Initial attack of Victoria's 2019-20 bushfires was delayed and under-resourced⁵

Fires ignited by lightning on evening of 21 Nov & detected on 22 Nov 2019	Detection Time	Initial attack	Resources deployed
Tambo 31 - Bruthen – Six Mile	0855hrs	?	22 Nov ?; 25 Nov - Direct attack impossible; Dec 19 - Contained; Dec 21 merged into Tambo Complex
Tambo 35 - Barmouth Spur - Marthavale	1035hrs	23/11/19	23 Nov - crews arrive & direct attack failed; 20-21-Dec 35km fire run
Tambo 38 & 39, W Tree Yalmy	1208hrs	24/11/19	22 Nov - 3 crew to 'monitor'; 24 Nov - 7 crew + 2 dozers; 25 Nov - 'minimal resources'
Tambo 41 - Ensay - Ferntree Creek	1435hrs	22/11/23	22 Nov - Air & small ground crews; 25 Nov - 3 dozers + ground crew

The ignitions on 21st November 2019 were followed by relatively mild conditions for 18 days where the 3pm Forest Fire Danger Index (FFDI) was below 30. This was conducive to effective suppression, particularly given the fire intensity is lower on the fire flanks and FFDI is lower early in morning and late in the afternoon. This FFDI of 30 was based on a Drought Factor of 10, even though the official KBDI was below about 60 and drought factor below 10 (e.g. about 7).⁵ Available firefighters for first attack were not stretched on 22nd November 2019 (**Table 7**).

Table 7: Under resourced initial attack yet 66,000 firefighters in Victoria³

Organisation	Career (Paid)			Volunteers			Grand total
	Operational	Support	Total	Operational	Support	Total	
DELWP FFMVic	2,228		2,228			0	2,228
CFA	1,371	1,056	2,427	34,380	20,241	54,621	57,048
MFB	1,997	350	2,347			0	2,347
SES	85	114	199	3,474	1,032	4,506	4,705
Total	5,681	1,520	7,201	37,854	21,273	59,127	66,328

There would have been plenty of tankers, pumpers and ultralights available on 22nd November and scope to augment the 53 FFMVic & CFA first attack dozers with contractor dozers (**Table 8**).

Table 8: Under resourced initial attack yet FFMVic & CFA had lots of equipment³

Item	Number
Tankers	1,725
Pumpers/Pumper tanker	324
First attack dozers & float	53
Ultralights	763
Command, Operational, Transport & Other vehicles	1,116
Total	3,981

Friends of Mallacoota Inc reported that the fire which started at Wingan Inlet was not contained more quickly and that effective aerial control at the point of ignition may have prevented the disastrous fire loss.⁴

6. Underwhelming fire suppression

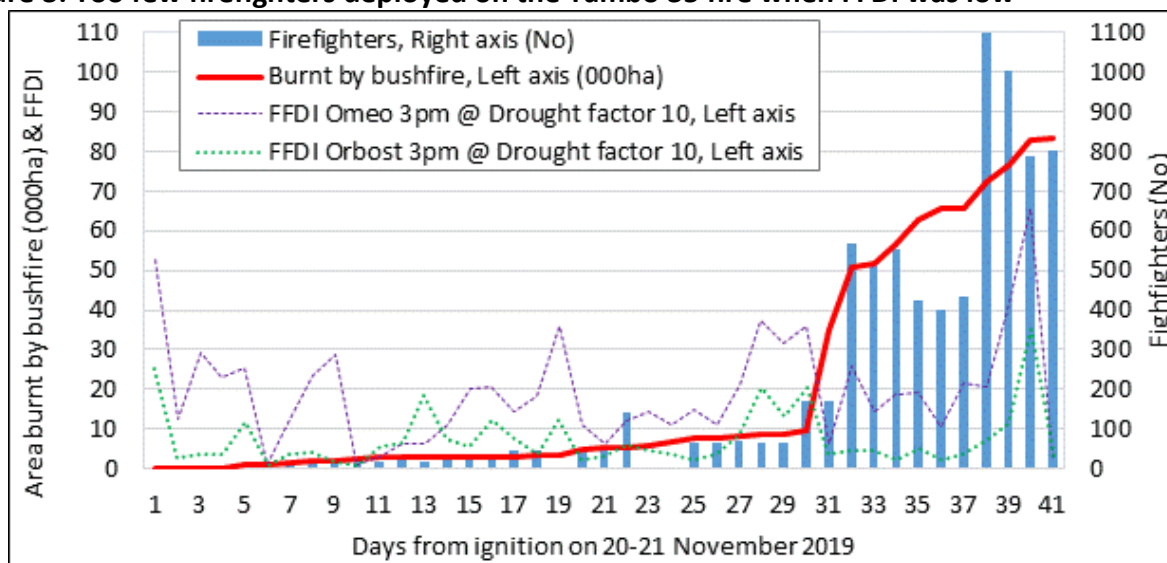
The two fires where initial attack was delayed until the second and third day (Tambo 35, Tambo 38 & 39) grew to become the largest of the four 'Tambo' fires at 39 days from ignition. The fires were generally less than a few hundred hectares for the first three days, then increased in size to a few thousand hectares on the fourth and fifth day after ignition (**Table 9**).

Table 9: Delayed initial attack & underwhelming suppression allowed the fires to get out of hand

Fires ignited by lightning on evening of 21 Nov & detected on 22 Nov 2019	Fire area days after ignition on 21/11/19 (ha)										
	1	2	3	4	5	18	19	28	30	39	
Tambo 31 - Bruthen – Six Mile	100			1,750	8,540			10,307			
Tambo 35 - Barmouth Spur - Marthavale	74	230				4,050			35,000	83,000	
Tambo 38 & 39, W Tree Yalmy	90		636	5,200	6,851					39,880	
Tambo 41 - Ensay - Ferntree Creek				2,500			10,000			20,000	

The result could have been so much better if more resources had been deployed earlier. The area burnt by bushfire steadily grew over the first 18 days when the 3pm FFDI was generally below 30, however, the number of firefighters was not materially increased until after major fire runs. Experienced fire fighters may argue that deploying more fire fighters early may have obviated the need for up to 1100 firefighters later (Figure 3).

Figure 3: Too few firefighters deployed on the Tambo 35 fire when FFDI was low³



CFA volunteers expressed concerns and frustrations about poor time and resource management including unnecessary delays in processing, briefing and deployment; poor or late tasking of crews; lack of incident management plans to incoming crews at starts of shifts; and crews having to wait a long time at the start of each shift for briefing and planning handover. Volunteer Fire Brigades Victoria (VFBV) recommended better cascading of briefings down field command levels, as well as obviating the need for centralised briefings.⁸

Access for direct attack and suppression was also a problem and not surprisingly the NSW Volunteer Fire Fighters Association mantra is **Land Management, Early Detection, Access, and Suppression**. If supremacy of life is paramount then we need more practical bushfire mitigation and suppression based on the science of fire behaviour and less ideology and modelling masquerading as science.

7. Acknowledgement

I thank David Packham OAM, Dr Neil Burrows, Phil Cheney, Vic Jurskis, Frank Batini, The Bushfire Front, Forest Fire Victoria and The Howitt Society members for advice and information that assisted with this report. I acknowledge the gallant efforts of all our firefighters, emergency services and support staff who work hard under difficult circumstances and put their lives on the line to save us from tragedy. It is time to ensure that these people no longer have to ‘grapple’ with inappropriate policy and procedures that do not support efficient, nor effective bushfire mitigation and suppression.

⁸ Volunteer Fire Brigades Victoria - VFBV (2020). Submission to IGEM Inquiry into the 2019-20 Victorian fire season.