

**Review of the implementation and effectiveness  
of the 2010 season's trial of the forest industry  
and Parks & Wildlife Service (PWS)  
Coordinated Smoke Management Strategy  
(CSMS).**

**Final Report**

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**Review of the implementation and effectiveness of the 2010 season's trial of the forest industry and Parks & Wildlife Service (PWS) Coordinated Smoke Management Strategy (CSMS).**

**Terms of Reference**

The Consultant will address the following terms of reference ("ToR") and produce a report for the Chief Forest Practices Officer by 30<sup>th</sup> September 2010.

1. Consult with the relevant representatives of the forest industry, the Environment Protection Authority (EPA) and PWS to gather information on:

a. The proportion of forest industry and PWS burning between March 2010 and June 2010 which complied with the CSMS 2010 with regard to:

- (i) Fuel Index (FI) calculation.
- (ii) Daily prescribed limits of FI relative to the total bid units.

b. The consistency and reliability of the independent interpretation of daily F160 forecasts.

c. The consistency and reliability of the use of the CSMS by practitioners.

d. The effect of the implementation of the CSMS (which includes any significant non-compliance) on air quality which may be determinable from the available air quality monitoring data.

e. The relative effect of non-CSMS burns on smoke levels. Note that details of non-CSMS burning are largely dependent on information which may be provided by the Tasmania Fire Service. It may not be possible to quantify the effects of this burning unless it occurred at specific locations, in isolation from any CSMS burning and was detected by monitoring equipment.

f. The cost to the forest industry of implementing the CSMS in 2010.

g. The number and distribution of complaints about smoke relative to findings on forestry burning activity and on air quality data, as required in (a) and (c) above. –

Note that the EPA needs to provide full details of complainants, subject to the provisions of the last paragraph, if this TOR is to be addressed adequately.

h. The management of complaints with regard to their processing and resolution.

2. Provide a report (electronic format only) on findings and make recommendations on:

a. Options for improving the effectiveness of the CSMS including its administrative process and technical inputs.

b. Other relevant constraints or issues that may need to be addressed such as the regulation of smoke from sources other than the forest industry.

3. Convene, through the Chief Forest Practices Officer, a meeting of the FPAC Smoke Management committee to review the consultant's report prior to submission to FPAC and the board of the FPA.

The Consultant will ensure that all complainant details collected and analysed as part of ToR 1 above remain strictly confidential in accordance with the Personal Information Protection Act 2004, and that those complainant names or details are not released or discussed with anyone other than the Forest Practices Authority and the EPA.

## **Executive Summary**

This review covers the period from 12/03/2010 to 31/05/2010 when most of the planned burning by the forest industry and the Parks and Wildlife Service was done. Three hundred and fifty two (352) planned burns were done on 16,932 hectares. This was 130 burns and 2,080 hectares less than for the 2009 period. The total Fuel Index (FI) reported for the area burnt was 279,500 which was about 30% less than the previous season's FI. About 40% of the area burnt in 2010 was for fuel reduction rather than regeneration and plantation establishment burning and was done by the PWS and Forestry Tasmania.

The CSMS users lodged 194 bids for FI allocations. There was 98.5% compliance with the allocated FIs which was an improvement on the previous season. Of the 3 FI exceedences recorded only 1 was above 1000 compared with 8 in 2009.

Air quality monitoring occurred throughout the burning period at nineteen stations covering the main regional areas of the State. This was a significant increase from the four stations which operated for the full season in 2009.

Seventy two (72) values above the national air quality standards and / or advisory levels were recorded at 12 monitoring stations in six airsheds. Forty eight (48) exceedences were not caused by CSMS burning and 6 were probably unrelated to CSMS burning. The remaining 18 resulted from a single smoke event in the Huon Valley airshed in late April 2010.

The recorded costs and loss of burning opportunities were not significant factors in the implementation of the CSMS in 2010.

Eighty two (82) separate complaints recorded in the Forest Practices Authority (FPA), and EPA's databases were reviewed in 2010 compared with 56 for 2009. Sixty four (64) complaints related to one smoke event in the Huon Valley airshed in April. The overall incidence of complaint relative to the burnt FI increased from 14 per 100,000 FI in 2009 to 29 for 2010. This was largely due to the Huon smoke event combined with the significant reduction in FI across the State. Two formal investigations of smoke events were done by the FPA.

Inputs to the CSMS in 2010 were reliable with consistent Bureau of Meteorology (BoM) F160 forecast interpretations and efficient technical service being provided by one FPA staff member.

Over two burning seasons the CSMS has demonstrated a capacity to effectively regulate well organised corporate planned burning on the basis of atmospheric conditions. The single serious CSMS smoke event in the Huon airshed in late April 2010 would have been mitigated if the "No Burning" provisions of the strategy been implemented. A prescriptive method for determining and implementing "No Burning" conditions is recommended with the implementation being the responsibility of the CSMS users.

The CSMS should be extended to cover additional private property burning in 2011. A proposal to achieve this in cooperation with the Tasmania Fire Service is recommended.

**Recommendations:**

**TOR 1 c**

- (ii): A prescriptive approach to the interpretation of the Bureau of Meteorology's Smoke Dispersion model should be adopted by the CSMS users in the Huon Valley airshed where smoke models indicating plume directions towards the north east, through east to south east are considered unfavourable unless particular circumstances indicate otherwise.**

**TOR 2 a:**

- (i) Responsibility for the management of "No Burning" situations should be with the CSMS users who must implement the amended "No Burning" prescription.**
- (ii) Where smoke modelling is not appropriate for the type of burning being done and the mesolaps forecast is likely to better represent the conditions for surface smoke direction it should be used and its use recorded on the CSMS noticeboard.**

**TOR 2 b:**

**The TFS should be requested to make the necessary changes to fire permit and fire registration data in time for the 2011 autumn burning period to enable them to participate in the CSMS as the coordinator for private property burning.**

**TOR 1 a: The proportion of forest industry and PWS burning between 12/03/2010 and 31/05/2010 which complied with the CSMS 2010 with regard to:**

**(i) Fuel Index (FI) calculation**

The correct classification of the fuel type is important in the calculation of the FI. If fuels are under-valued then the FI will indicate a lower than actual value for the fuels being burnt. Only three fuel classes are identified which makes it easier to subjectively determine the appropriate class. Within the range of heavy fuels to light and very light fuels, determination of the class is easy at either end of the range but ambiguous for some of the fuels in between. In 2009 a sample of “light fuel” burns was inspected in the field and in most cases was found to have been correctly classified. Where differences occurred the fuels were found to have been over-valued or put into a higher class than they actually were. No examples of under-valued fuels were seen but the practice of “averaging” was being used discretely for some types of discontinuous burning. The 2009 review recommended that a universal application of the “net area” method be used to determine the FI for discontinuous fuels thus maintaining the integrity of the 40, 15 and 5 multipliers for the different fuel classes.

Given that the “light fuel” forests in which the CSMS users were operating were unlikely to change, field inspections were not done in 2010. Instead, the burning information supplied by the users working predominantly in the “light fuel” regions was audited to determine whether the FI figures supplied were consistent with the fuel type and the calculation method. The audit confirmed that the FI’s entered were consistent with the fuel classifications and that net area calculations were being used.

**(ii) Daily prescribed limits of Fuel Indices relative to completed Fuel Indices reported by the CSMS users**

From 12/03/2010 to 31/05/2010 the CSMS users lodged 194 completed burning reports. Allowable Fuel Indices were exceeded 3 times (1.5%). This was a significant reduction from the 2009 season (4%). Two exceedences were by less than 200 units and one exceeded 1000 units (0.5%). This compares favourably with the 2009 season when there were 8 exceedences greater than 1000 units (2.5%). Details of the 2010 exceedences are shown in Table 1:

Date	User	Airshed	Completed FI	Allowable FI	Exceedence
16/04/2010	Gunns SE	Huon	200	14	186
16/04/2010	PWS	Huon	193	29	164
16/04/2010	Gunns NW	Arthur	5945	4716	1229

**Table 1: Details of exceedences of allowable Fuel Indices in 2010**

**TOR 1 b: (i) The consistency and reliability of the independent interpretation of the daily F160 forecasts**

Over the span of 79 days between 11/03/2010 and 28/05/2010, one FPA staff member posted 790 interpretations of the F160 forecast supplied by the BoM relating to the Ventilation Index and the inversion height class. Of the two elements being interpreted, the Ventilation Index is read directly from the forecast whereas the inversion height class is interpreted from the aerological diagram.

Fifteen per cent (15%) of the FPA's interpretations were selected at random and checked for accuracy against the BoM's F160 forecast diagrams. Three (2.5%) interpretations of the Ventilation Index were incorrect being posted at one class higher than actual. This is twice the error rate for 2009 (1.2%). One difference (0.8%) was noted in the interpretation of the inversion height class where the reviewer interpreted the inversion height to be in a class lower than posted. This compares favourably with interpretation differences in 2009 (2.9%).

The early morning interpretation of 790 F160 forecasts by one FPA staff member in 2010 was consistent, reliable and a commendable effort.

**TOR 1 c: The consistency and reliability of the use of the CSMS by practitioners**

**(i) Recording of completed burning FIs**

An important part of the CSMS is the daily log of burning activity. If details of burning activity are not accurately reported to the database, the strategy is compromised.

To check the level of compliance with this requirement the users were asked to provide an independent list of all their completed burning for the period from 12/03/2010 to 31/05/2010. This was used to check the 194 completed daily burning FI entries to the FPA database and calculate the amount of hectares burnt in each airshed.

To determine a level of compliance, excluding CSMS entries below 100, differences of 20% or more were considered 'significant'.

There was an overall improvement in the accuracy of reporting to the CSMS database in 2010 with significant differences reducing from 43% of the entries in 2009 to 15% in 2010. None of the differences resulted in an exceedence of the CSMS allocation for the day.



<b>CSMS User</b>	<b>Total entries</b>	<b>*Differences</b>	<b>%</b>
FT Derwent	17	0	0
FT Huon	7	0	0
FT Mersey	17	9	53
FT Bass	30	8	27
FT Murchison	16	1	6
Gunns SE	16	2	12
Gunns NE	11	0	0
Gunns NW	25	0	0
FEA	5	0	0
PWS Fire	41	8	19
Norske Skog	9	2	22
Totals	194	30	15

**Table 2: Differences between CSMS database and users burning records**

(\* excludes entries < 100 FI and <20% variation)

Differences were more frequent in airsheds with predominantly Light and Very Light fuels where burning of the same areas extended over several days. The differences in Mersey were all the consequence of measurement of coupes after burning resulting in reduced areas and significant changes to the reported FI. As noted last year, the best data entry is done by having the minimum number of people who fully understand the system responsible for the task. This approach produces consistently accurate data entries, even with multiple fuel types.

**(ii) The consistency and reliability of daily smoke dispersion forecast interpretation by the CSMS users**

The relevance of a correct interpretation of the Bureau of Meteorology's smoke dispersion forecast as 'favourable' or 'unfavourable' is the effect it has on the allowable FI. An incorrect interpretation can result in a 66% increase or decrease in the FI allowance.

The reviewer checked the smoke dispersion forecasts for the airsheds involved in each burning day for which a completed entry was recorded and classified them as 'favourable', meaning predicted to have no impact on downwind communities or 'unfavourable', meaning predicted to have an impact on downwind communities. The reviewer's results were then compared with the users' daily entries to the CSMS database.

	Same		Different		Total
			UF to F	F to UF	
FT Mur	15	(94%)	1	0	16
FT Mers	15	(88%)	0	2	17
FT Bass	24	(80%)	1	5	30
FT Dwent	16	(94%)	1	0	17
FT Huon	5	(71%)	0	2	7
Gunns Bu	25	(100%)	0	0	25
Gunns Ta	11	(100%)	0	0	11
Gunns Tr	14	(88%)	0	2	16
FEA	5	(100%)	0	0	5
Norske	7	(78%)	0	2	9
PWS	34	(83%)	2	5	41
<b>Totals</b>	<b>171</b>		<b>5</b>	<b>18</b>	<b>194</b>
	88%		2.6%	9.3%	

**Table 3: Comparison of smoke model interpretations between the review audit and the CSMS users**

In table 3 the column headed “Same” shows the number and percentage of the smoke dispersion forecast interpretations made by the users which were the same as the reviewer’s classification. The column headed UF to F shows the number of smoke dispersion forecasts made by the users which were different from the reviewer’s where the difference was a change from ‘unfavourable’ (users interpretation) to ‘favourable’ (reviewer’s interpretation). The column headed F to UF shows the opposite interpretation.

Given the subjectivity of smoke dispersion interpretation, there has been a significant improvement from 2009 when the agreed interpretation percentage was 74% compared with 88% for 2010 and negative difference interpretations were 16% compared with 9.3% in 2010.

	Coast	Arthur	Surrey	Miena	Brushy	Diddleum	Goulds	Tooms	Wiel	Repulse	Huon	Totals
Mur			+									1
Mers			-		-							2
Bass						+ - -	- - -					6
Dwent									+			1
Huon											- -	2
G Bu												0
G Ta												0
G Tr									-		-	2
FEA												0
NS										- -		2
PWS	+	- +					- - -				-	7
<b>Totals</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>3</b>	<b>6</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>4</b>	<b>23</b>

**Table 4: Distribution of differences in smoke model interpretation by airsheds and users; + means a positive difference, - means a negative difference.**

Table 4 shows the distribution of differences in smoke model interpretation by airsheds and users. The improvement in Surrey and Miena compared with 2009 is significant (2009: Surrey 10, Miena 17). The Goulds and Huon airsheds had the largest differences in interpretation. The potential effect of smoke moving offshore in an easterly direction on St Helens is difficult to interpret from the smoke models, without knowing the precise location and size of the burns in the Goulds Country airshed. The spread of population centres throughout the Huon Valley airshed results in a less ambiguous effect when smoke moves anywhere from north east through east to south east. The Huon airshed may benefit from a more prescriptive approach as was suggested for Surrey Hills in the 2009 Review. This would dictate that smoke models which show plume directions towards the north east, through east to south east are routinely considered unfavourable unless particular circumstances, including very low FIs indicate otherwise.

The PWS uses the mesoscale wind forecast for many of their low intensity burns in preference to the smoke model which may account for their high rate of difference.

**Recommendation:**

**A prescriptive approach to the interpretation of the Bureau of Meteorology's Smoke Dispersion model should be adopted by the CSMS users in the Huon Valley airshed where smoke models indicating plume directions towards the north east, through east to south east are considered unfavourable unless particular circumstances indicate otherwise.**

**TOR 1 d: The effect of the implementation of the CSMS (which includes any significant non-compliance) on air quality which maybe determinable from the available air quality monitoring data.**

In 2009 air quality data was obtained initially from four monitoring stations which increased to nine during the latter stages of the burning season. In 2010 nineteen stations were monitoring air quality. A fair comparison of values of air quality above the national standards and /or advisory levels between the two seasons is therefore compromised and is not attempted. Instead, each airshed is reviewed separately and the air quality monitoring data, where it exists, is compared with the actual daily burning records from the CSMS users and not from the CSMS database which is considered to be a less reliable source of burning data (see TOR 1c(i)).

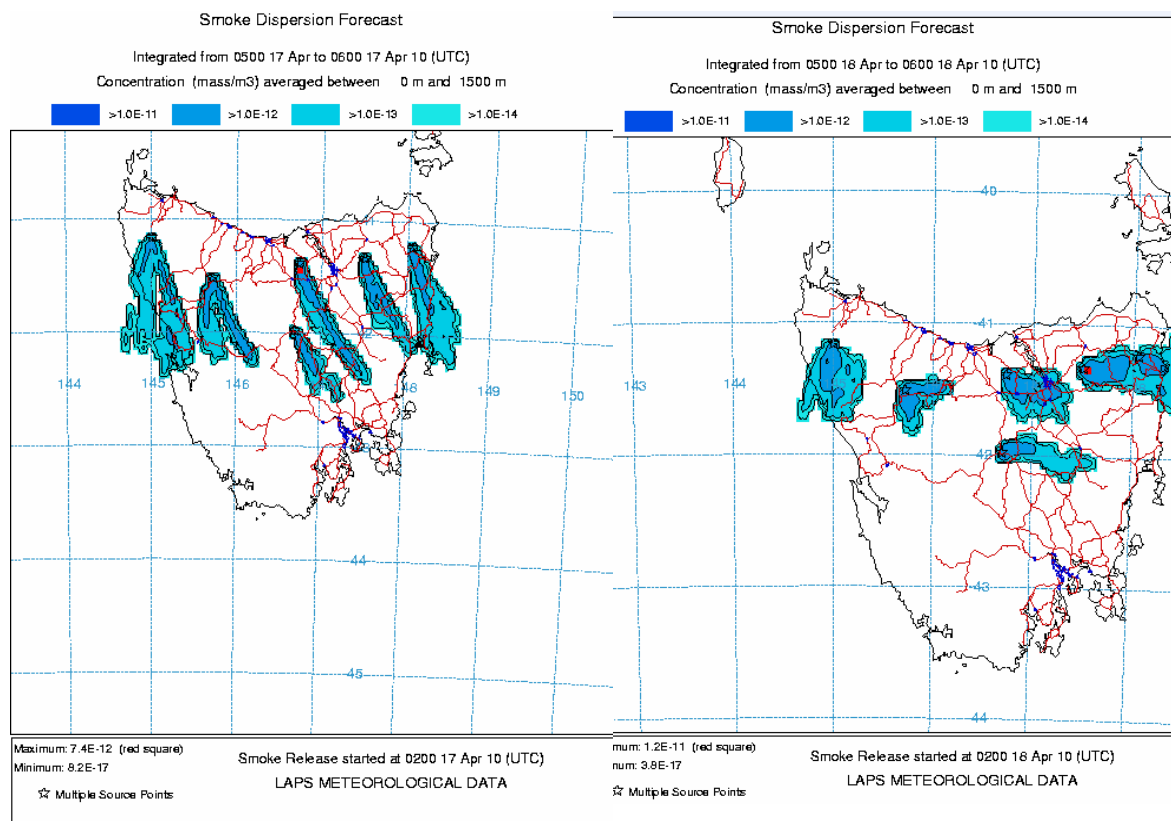
For the purpose of this review values of air quality above the national standards and / or advisory levels are defined as a PM 10 of 50 µg per m<sup>3</sup> and above and a PM 2.5 of 25 µg per m<sup>3</sup> and above.

**South Arthur :**

Arthur	Totals		Emu River		Complaints
	Area (ha)	FI	PM 2.5	PM 10	
12/3/2010	30	1197	2	14	
13/3/2010	35	1410	2	13	
15/3/2010			10	23	
31/3/2010	60	2387	3	19	
1/4/2010	208	8316	3	18	
2/4/2010	131	4423	3	15	
3/4/2010	41	1465	4	19	
4/4/2010			3	13	
5/4/2010			3	13	
14/4/2010	30	150	1	6	
15/4/2010	94	810	4	10	
16/4/2010	286	10497	4	26	
17/4/2010	228	9100	8	27	
18/4/2010	216	8650	26	54	
19/4/2010	108	4310	12	28	
20/4/2010			6	13	1
1/5/2010	132	660	4	19	
2/5/2010	400	2000	6	32	
3/5/2010	111	1658	6	38	
4/5/2010			9	39	
17/5/2010	600	3000	5	13	
	2710	60033			1

**Table 5: Airshed summary South Arthur**

On 17/04/2010 the Ventilation Index for the South Arthur at 1600 was predicted to be “Poor” and the Inversion Height >1500 m. The allowable FI for a favourable dispersion was 16250. On the 18/04/2010, the Ventilation Index for the South Arthur was predicted to be “Very Poor” and the Inversion Height >1500m. The allowable FI for a favourable dispersion model was 7250.



**Figure 1: Smoke Models for northern Tasmania 17 & 18 /04/2010**

The smoke models for the South Arthur for both days are “Favourable” as shown in Figure 1 above. While the allowable FI was exceeded by 1150 on the 18/04/2010, it seems unlikely that the smoke from the South Arthur burning would have influenced the air quality readings at Emu River on 18/04/2010. This and the previous day can be compared with a similar situation on the 1/04/2010 and 2/04/2010 when the smoke model was “Unfavourable” yet the readings from Emu River were unaffected. The values of air quality above the national standard and advisory level on the 18/04/2010 were more likely to have been caused by an event which was closer to the monitoring station.

**Surrey Hills:**

The airshed summary for Surrey Hills shows values of air quality above the national standard and advisory level at Emu River on 18/04/2010 (as above) when no CSMS burning was done in Surrey Hills on either the 17/04/2010 or the 18/04/2010 and as indicated by the smoke models, the plume direction was predicted to be moving inland.

Values of air quality above the national standards and / or advisory levels on the 21/04/2010 and 22/04/2010 at Emu River were the subject of an investigation by the FPA which could not conclude that the CSMS burning alone was responsible for such high readings.<sup>1</sup>

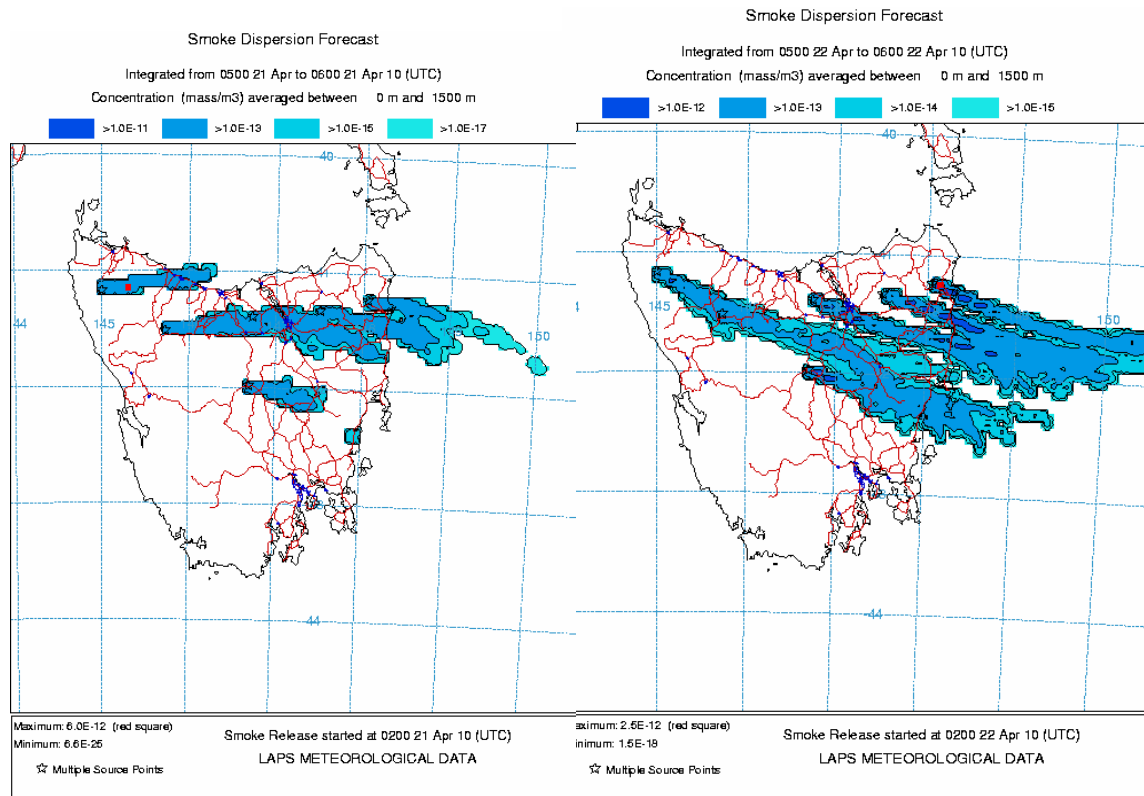
<sup>1</sup> Draft Review of burning 19-22 April in the Surrey Hills Airshed, FPA 2/06/2010

The smoke models for Surrey Hills for the 21/04/2010 and 22/04/2010 (Figure 2) both show a “Favourable” dispersion to the inland. The reported wind direction was westerly which generally followed the model. It is inconsistent that such a concentration of particulates at Emu River, did not register at either Sheffield or Ulverstone with the westerly stream. This is in contrast to the 18/04/2010 when a lower level at Emu Bay appears to have affected both of the stations to the east. No CSMS burning was done in the South Arthur from 20/04/2010 to the 1/05/2010 which discounts the South Arthur airshed as a possible source.

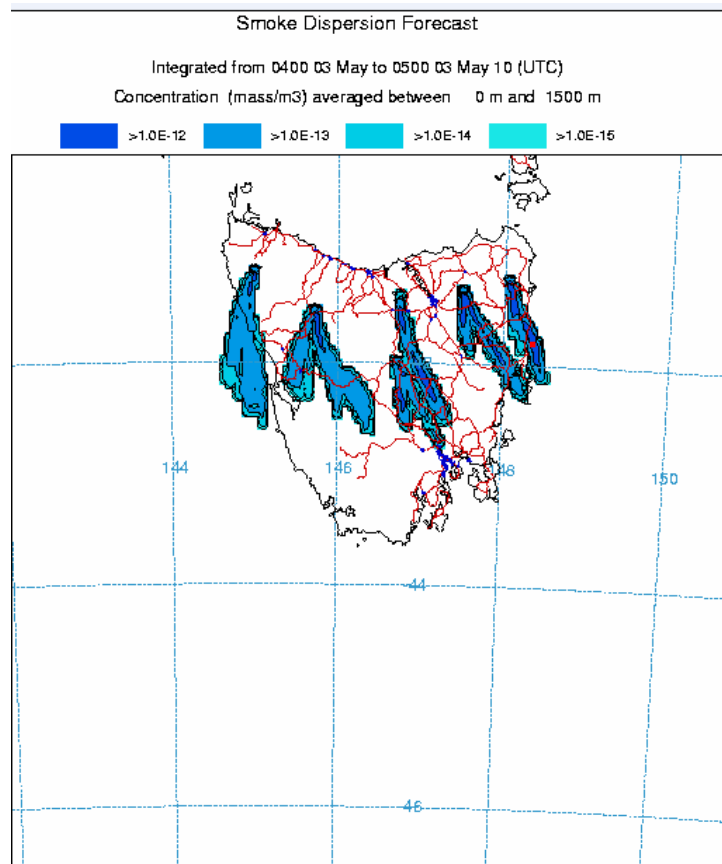
Surrey	Totals		Emu River		Sheffield		Ulverstone		Complaint
	Area (ha)	FI	PM 2.5	PM 10	PM 2.5	PM 10	PM 2.5	PM 10	
15/3/2010	20	300	10	23			8	22	
16/3/2010	199	7460	11	30			11	29	
17/3/2010	9	135	10	23			12	27	
18/3/2010	20	300	4	15	3	23	3	26	
22/3/2010	12	180	2	17	2	11	2	18	
23/3/2010	9	135	2	11	1	10	2	13	
24/3/2010	19	285	1	8	1	7	4	13	
25/3/2010	52	1330	9	17	3	12	8	22	
29/3/2010	20	300	1	9	1	6	2	14	
30/3/2010	30	450	4	17	3	12	4	22	
31/3/2010	152	5109	3	19	4	18	3	26	
1/4/2010	10	150	3	18	16	26	3	19	
4/4/2010	47	1878	3	13	4	11	4	12	
5/4/2010	44	1776	3	13	12	21	5	18	
7/4/2010	28	420	5	26	4	21	6	46	
8/4/2010	17	255	4	13	2	9	2	12	
9/4/2010	20	300	3	18	4	21	3	24	
12/4/2010	16	240	1	8	1	7	1	8	
13/4/2010	13	200	1	6	0	5	2	12	1
14/4/2010	32	480	1	6	1	3	2	7	
15/4/2010	47	1330	4	10	2	7	12	20	1
16/4/2010	145	2225	4	26	4	28	4	34	
18/4/2010			26	54	11	19	14	36	
19/4/2010	83	2650	12	28	11	19	10	31	1
20/4/2010	38	670	6	13	7	17	6	18	
21/4/2010	10	150	48	60	6	15	8	26	1
22/4/2010			167	200	8	17	7	39	3
26/5/2010	10	150	1	8	8	15	5	15	
	1102	28858							7

**Table 6: Airshed summary for Surrey Hills**

Table 6 shows the level of CSMS burning on 20/04/2010 and 21/04/2010 which was very low given that the allowable units were 9,750 and 16,250 respectively. A much higher output on 19/04/2010, also with a “Favourable” dispersion model, had little effect on the air quality measured at Emu River on either the 19/04/2010 or on the following day. This review concludes that another, closer source of smoke was the most likely cause of the values of air quality above the national standards and / or advisory levels on 21/04/2010 and 22/04/2010.



**Figure 2: Smoke models for northern Tasmania 21 & 22/04/2010**



**Figure 3: Smoke model for 1600 EST 3/05/2010 (Refer to the section on Brushy Lagoon below)**

**Brushy Lagoon:**

Brushy	Totals		Carrick		Exeter		Sheffield		Ulverstone		Rowella		Ti Tree Bend		George Town		Complaint
	(Ha)	FI	PM 2.5	PM 10	PM 2.5	PM 10	PM 2.5	PM 10	PM 2.5	PM 10	PM 2.5	PM 10	PM 2.5	PM 10	PM 2.5	PM 10	
31/3/2010	29	1160	2	14	2	22	4	18	3	26	1.8	8	3.79	9	4.49		
4/4/2010	16	640	2	8	1	9	4	11	4	12	1.1	6.5	3.53	6.07	3.23		
6/4/2010	79	395	2	12	2	15	3	13	4	22	2.2	9	3.99	10.79	4.54		
7/4/2010			5	21	4	29	4	21	6	46	3.5	13.8	5.23	16.97	6.13		1
9/4/2010	81	1215	3	13	2	18	4	21	3	24	2.1	7.7	3.59	9.71	5.41		
13/4/2010	22	880	4	12	2	13	0	5	2	12	3.8	8.3	5.58	8.65	3.77		
15/4/2010	86	1440	4	12	3	15	2	7	12	20	2.7	9	6.71	12.31	4.97	13.46	
16/4/2010	5	75	5	29	4	34	4	28	4	34	4.2	15	5.82	14.01	4.79	14.67	
18/4/2010	5	75	13	26	12	37	11	19	14	36	8.9	17.4	14.22	21.26	12.41	20.79	1
19/4/2010	17	255	13	24	12	31	11	19	10	31	8	15.2	12.81	20.66	11.2	22.26	
20/4/2010	13	195	6	13	5	19	7	17	6	18	4.9	11.6	8.26	16.12	10.98	23.63	
26/4/2010	25	375	4	17	3	22	12	24	3	21	2.3	10	4.43	10.4	6.92	17.8	
30/4/2010	41	620	2	9	3	20	1	6	4	15	3.2		10.03	15.21	0		
3/5/2010	66	988	8	37	6	43	6	36	8	53	5.3		12.9	24.14	9.72	26.65	
4/5/2010										54							
24/5/2010	43	645	7	13	10	20	2	9	4	17	2.8	9.3	10.79	24.67	8.65	19.11	
27/5/2010	40	600	7	13	10	20	6	11	4	10	3.7	9.5	12.02	20.49	8.95	19.82	
	568	9558															2

**Table 7: Airshed summary for Brushy Lagoon**

The two values above the national standards for PM 10 at Ulverstone on 3 & 4/05/2010 are probably not smoke due to the absence of a correspondingly high PM 2.5. The Smoke Model indicates a strong inland smoke plume movement (see previous page) suggesting that the source was either dust or salt.

**Miena:** No values of air quality above the national standards and / or advisory levels.

Miena	Totals		Gretna		New Town		Carrick		Exeter		Ti Tree Bend		Rowella		George Town	
	(Ha)	FI	PM 2.5	PM 10	PM 2.5	PM 10	PM 2.5	PM 10	PM 2.5	PM 10	PM 2.5	PM 10	PM 2.5	PM 10	PM 2.5	PM 10
1/04/10	25	375	5	10	7.68	13.67	3	12	2	20	4.59	9.18	1.8	8.5	4.5	
15/04/10	175	4620	2	8	6.5	12.48	4	12	3	15	6.71	12.31	2.7	9	4.97	13.46
16/04/10	123	1845	7	14	8.51	15.82	5	29	4	34	5.82	14.01	4.2	15	4.79	14.67
19/04/10	144	2160	13	23	18.08	27.31	13	24	12	31	12.81	20.66	8	15.2	11.2	22.26
20/04/10	2	30	17	25	14.89	21.65	6	13	5	19	8.26	16.12	4.9	11.6	10.98	23.63
	469	9030														

**Table 8: Airshed summary for Miena**



**Diddleum:**

Diddleum	Totals		Lilydale		Scottsdale		Rowella		Ti Tree Bend		George Town		Complaint
	(Ha)	FI	PM 2.5	PM 10	PM 2.5	PM 10	PM 2.5	PM 10	PM 2.5	PM 10	PM 2.5	PM 10	
14/3/2010													1
17/3/2010			37	54	48	67			28.27		27.84		2
24/3/2001	85	3384	2	12	4	18	3.7	12.7	5.65	16.3	4.47	11.13	
6/4/2010	1	5	1	9	1	12	2.2	9	3.99	10.79	4.54		
7/4/2010			3	13	3	16	3.5	13.8	5.23	16.97	6.13		
8/4/2010			2	13	2	12	1.7	7.9	3.72	8.35	3.91		
9/4/2010	5	75	2	18	2	17	2.1	7.7	3.59	9.71	5.41		
14/4/2010	57	810	7	18	3	9	2.5	7.9	3.91	6.99	4.94		
15/4/2010	162	3182	4	13	3	14	2.7	9	6.71	12.31	4.97	13.46	
16/4/2010	40	580	4	19	6	25	4.2	15	5.82	14.01	4.79	14.67	
20/4/2010			5	16	7	20	4.9	11.6	8.26	16.12	10.98	23.63	
21/4/2010			11	23	10	22	5.9	12.3	8.38	16.03	10.38	15.37	
22/4/2010			6	17	6	17	8.6	15	8.14	10.71	16.97	25.75	1
23/4/2010			6	14	7	15	5.1	14.5	8.2	11.46	10.47	18.29	1
26/4/2010	25	125	3	14	2	13	2.3	10	4.43	10.4	6.92	17.8	
27/4/2010			4	13	1	11	1.9	8.9	3.4	8.05	4.89	11.08	
28/4/2010			4	13	2	15	3.3	14.4	4.11	9.42	0		
3/5/2010	43	363	7	25	5	30	5.3		12.9	24.14	9.72	26.65	
4/5/2010			5	18	7	26	6.1		8.5	14.25	11.56	23.23	1
11/5/2010	65	975	4	11	1	10	1.6		2.7	8.55	0	8.86	
12/5/2010	66	990	9	15	2	7	2.9	1.8	11.8	19.28	2.9	7.39	
13/5/2010	44	660	7	12	1	4	2.5	3.9	9.3	15.43	6.25	11.89	
14/5/2010	23	115	15	21	2	6	4	7.4	16.8	22.35	8.44	18.33	
15/5/2010			12	18	2	7	4.9	10.7	13.2	17.44	7.3	13.02	
16/5/2010			12	19	2	7	9.4	15.9	12.8	16.09	7.26	11.98	
17/5/2010	136	2040	15	22	2	8	6.4	11.6	19.9	26.66	11.01	20.84	
18/5/2010	32	480	17	23	5	12	10.9	16	22.6	31.54	14.84	22.09	
19/5/2010	72	1080	13	20	4	11	9	13.8	24.2	27.16	16.12	23.45	
20/5/2010	4	60	9	14	1	6	3.5	7.7	11.8	22.01	12.82	26.62	
21/5/2010	114	1710	7	11	1	4	3.2	7.8	0	27.42	7.81	21.71	
25/5/2010	94	1410	2	10	2	12	0.8	6.4	14.5	19.22	9.44	19.44	
26/5/2010					1	6	2.8	7.7	13.1	21.6	9.06	18.66	
27/5/2010	162	810			2	8	3.7	9.5	12	20.49	8.95	19.82	
	1230	18854											6

**Table 9: Airshed summary for Diddleum**

The six values of air quality above the national standards and / or advisory levels in the Diddleum airshed were recorded in the period prior to any CSMS burning being done.

**Goulds Country:**

Goulds	Totals		Derby		Fingal		St Helens		Complaint
	(Ha)	FI	PM 2.5	PM 10	PM 2.5	PM 10	PM 2.5	PM 10	
17/3/2010			44	75			31	59	
24/3/2010	30	1192	2	20	1	13	3	17	
25/3/2010	60	453	3	20	3	20	4	19	
1/4/2010	58	2325	3	23	1	10	2	23	
5/4/2010									1
8/4/2010	60	300	2	30	1	7	4	26	
9/4/2010	100	500	3	37	2	10	4	20	
10/4/2010	10	50	2	27	5	13	4	20	
11/4/2010			2	12	1	5	1	10	
12/4/2010			3	16	1	6	0	6	
13/4/2010	147	735	3	26	1	7	4	17	
14/4/2010			4	23	4	13	4	16	
15/4/2010	165	2900	3	26	2	14	5	25	
16/4/2010	23	345	3	39	13	33	3	26	
17/4/2010			3	32	8	18	6	28	
18/4/2010			6	37	8	24	9	30	1
20/4/2010	4	100	5	38	6	17	8	28	
3/5/2010	168	840	5	22	8	26	5	28	
4/5/2010	30	150	7	29	5	21	7	34	
5/5/2010			2	16	3	9	2	12	
6/5/2010	20	300	3	20	3	11	3	15	
12/5/2010	555	2775	3	12	1	4	1	6	
13/5/2010	408	2040	7	15	1	7	3	14	
14/5/2010	90	450	12	17	2	8	13	21	
15/5/2010			7	14	5	11	11	18	
16/5/2010			7	13	22	32	5	14	
17/5/2010	620	3100	10	15	12	28	8	15	
18/5/2010	80	400	11	17	13	27	8	15	
19/5/2010	30	150	10	18	11	25	23	32	
21/5/2010	20	300	7	11	2	11	2	12	
	2678	19405							2

**Table 10: Airshed summary for Goulds Country**

The four values of air quality above the national standards and / or advisory levels in the Goulds Country airshed were recorded in the period prior to any CSMS burning being done.

**Mount Tooms:**

Tooms	Totals		St Helens	
	Area (Ha)	FI	PM 2.5	PM 10
24/03/2010	35	175	3	17
25/03/2010			4	19
26/03/2010	65	975	6	34
30/03/2010	10	50	1	17
31/03/2010	20	100	3	27
6/04/2010			2	14
16/04/2010	305	3180	3	26
17/04/2010	28	420	6	28
30/04/2010	20	100	3	10
1/05/2010	66	330	3	15
2/05/2010			4	20
3/05/2010	857	4285	5	28
4/05/2010	2	10	7	34
17/05/2010			8	15
18/05/2010	74	370	8	15
	1482	9995		

**Wielangta:** No monitoring station

Wielangta	Totals	
	Area (Ha)	FI
9/04/2010	12	180
15/04/2010	10	150
16/04/2010	20	300
19/04/2010	21	580
20/04/2010	41	1640
30/04/2010	26	390
5/05/2010	149	2250
13/05/2010	20	800
	299	6290

**Tables 11 & 12: Airshed summaries for Mount Tooms and Wielangta:** No values of air quality above the national standards and / or advisory levels.

**Repulse:**

Repulse	Totals		Gretna		Bryn Estyn		New Town	
	Area (Ha)	FI	PM 2.5	PM 10	PM 2.5	PM 10	PM 2.5	PM 10
25/3/2010	163	3240	1	4	1	5	3.35	7.53
26/3/2010			2	8	2	10	3.87	12.2
28/3/2010			7	14	6	14	6.73	11.01
29/3/2010	30	730	2	5	3	8	2.96	5.22
30/3/2010	170	4300	2	7	5	15	4.47	10.1
31/3/2010	130	1950	7	18	8	23	4.9	13.13
1/4/2010	352	6483	5	10	7	14	7.68	13.67
5/4/2010	244	7685	4	8	5	11	4.31	8.58
6/4/2010	90	3090	2	5	4	10	2.72	7.19
7/4/2010	93	1385	2	7	4	13	5.69	11.39
8/4/2010			3	7	5	14	5.19	7.95
9/4/2010	110	1650	2	6	3	11	4.96	10.37
10/4/2010	66	990	2	7	4	11	5.55	9.32
16/4/2010	11	55	7	14	5	13	8.51	15.82
19/4/2010	127	3885	13	23	17	31	18.08	27.31
20/4/2010			17	25	23	32	14.89	21.65
21/4/2010			8	13	9	15	9.61	14.08
22/4/2010	123	1845	4	10	5	10	7.24	13.08
5/5/2010			2	6	2	8	3.4	7.14
13/5/2010	34	510	5	7	3	6	13.36	20.45
	1743	37798						

**Table 13: Airshed summary for Repulse:** No values of air quality above the national standards and / or advisory levels.

**West Coast:** No monitoring station

**Undefined airshed:** No monitoring station

West Coast	Totals	
	Area (Ha)	FI
19/04/2010	2172	11070
20/04/2010	200	1000
17/05/2010	62	310
	2434	12380

Undefined	Totals	
	Area (Ha)	FI
1/04/2010	73	2920

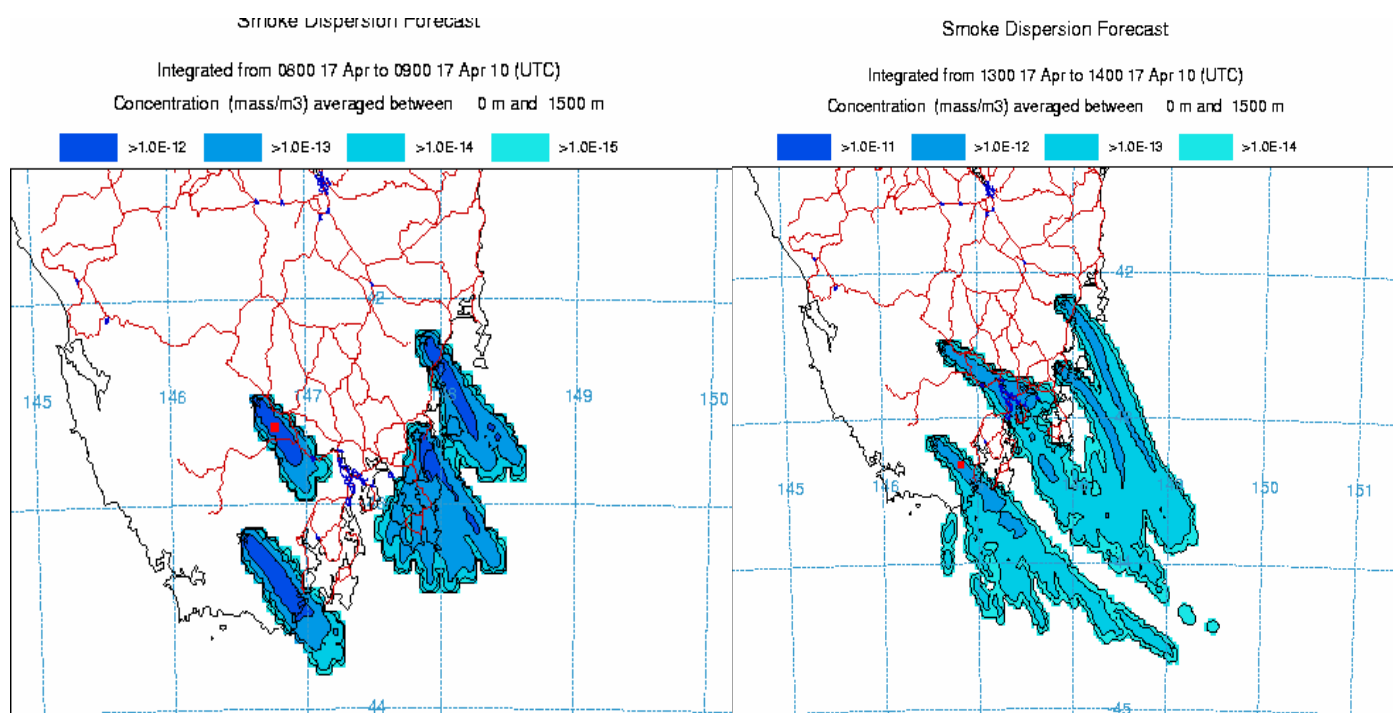
**Tables 14 & 15: Airshed summaries for West Coast and Undefined**

**Huon Valley:**

Huon	Totals		Geeveston		Huonville		Judbury		New Town		Complaint
	(ha)	FI	PM 2.5	PM 10	PM 2.5	PM 10	PM 2.5	PM 10	PM 2.5	PM 10	
28/3/2010	305	10150	9	18	7	14	7	19	6.73	11.01	
31/3/2010	143	5720	7	21	4	17	3	23	4.9	13.13	
1/4/2010	5	200	12	23	9	19	20	35	7.68	13.67	3
5/4/2010	313	12520	7	17	4	10	4	17	4.31	8.58	
6/4/2010	274	10960	9	20	5	11	2	13	2.72	7.19	
7/4/2010	150	3395	20	34	6	13	5	17	5.69	11.39	
8/4/2010			9	18	7	13	7	18	5.19	7.95	
9/4/2010			10	24	5	14	4	22	4.96	10.37	
15/4/2010	16	640	12	24	7	17	3	19	6.5	12.48	
16/4/2010	89	3310	25	40	15	27	7	24	8.51	15.82	1
17/4/2010	258	8755	61	77	17	26	23	41	10.44	17.02	1
18/4/2010	249	6460	52	70	43	57	56	80	15.06	22.87	13
19/4/2010			90	123	36	49	39	60	18.08	27.31	24
20/4/2010			51	69	28	39	27	44	14.89	21.65	21
21/4/2010			14	28	13	21	8	20	9.61	14.08	1
22/4/2010	69	907	13	26	12	21	7	16	7.24	13.08	
26/4/2010			27	38	162	220					
27/4/2010					160	176					
4/5/2010	95	475	16	26	10	16	3	15	8.78	15.62	
16/5/2010			25	37							
17/5/2010			28	40							
18/5/2010			23	31							
19/5/2010			30	40							
20/5/2010			26	35							
21/5/2010			31	41							
22/5/2010			38	47							
23/5/2010			48	57							
24/5/2010			52	60							
25/5/2010			60	75	42	52			35.62	50.42	
26/5/2010			56	67	29	35					
27/5/2010	178	890	52	60	21	26			16.7	22.88	
28/5/2010			54	63	23	29	8	14	30.67	43.61	
29/5/2010			40	50	29	35	13	18	22.99	29.07	
30/5/2010			48	63	24	35	12	24	18.52	29.22	
31/5/2010			50	59	22	31	8	17	14.44	23.04	
	2144	64382									64

**Table 16: Airshed summary for Huon Valley**

The values of air quality above the national standards and / or advisory levels in the Huon Valley airshed between the 16/04/2010 and 18/04/2010 were the subject of a specific review and report to the FPA on 20/04/2010<sup>2</sup>. Poor air quality persisted in the lower Huon Valley through to the 20/04/2010. In summary the review found that the conditions for a “No Burning” day, as prescribed in the CSMS Implementation Plan 2009, prevailed at 0900 on the 17/04/2010 but the procedures were not in place to either identify or implement the provisions. The two images below show the modelled plume progression from 1800/1900 EST to 2300/2400 EST on the 17/04/2010. (Note that local time adds 10 hours to the UTC time).



**Figure 4 Smoke Model for southern Tasmania 17/04/2010**

The model predicted an unfavourable dispersion for Geeveston with poor ventilation although the inversion height was predicted to be above 1500m. The smoke model for the 18/04/2010 indicated a similar dispersion pattern with very poor ventilation.

It is worth noting that the almost continuous values of air quality above the national standards and / or advisory levels at the Geeveston air quality monitoring station from 16/05/2010 to 31/05/2010 were not caused by CSMS burning which had ended. These values were most likely to have been caused by domestic wood heating in Geeveston with the onset of colder weather. The single CSMS record on 27/05/2010 was a PWS fuel reduction burn on the D’Entrecasteaux Plains in the far south of the airshed which would not have registered at Geeveston. Also unrelated to CSMS burning are the extremely high readings at Huonville on 26 & 27/04/2010. There had been no CSMS burning since 22/04/2010. The limited TFS data shows one private burn at Glen Huon on 26/04/2010 and nothing on 27/04/2010.

<sup>2</sup> “Review of burning 16-18 April 2010 in the Huon Airshed” Richard Chuter, 20/04/2010

Summary:

With the exception of the single event in the Huon airshed, the effects of which the correct implementation of the CSMS would have mitigated, there were no values of air quality above the national standards and / or advisory levels in the rest of the airsheds across the State which can be directly attributed to CSMS burning. Unregulated private burning was the most likely cause of the Surrey Hills event and based on anecdotal reports and several registrations with the Tasmania Fire Service (TFS) over the same period, probably contributed to the Huon event as well.

**TOR 1 e: The relative effect of non-CSMS burns on smoke levels**

Information which is currently collected by the TFS during the Fire Permit Period (FPP) and voluntarily provided by some burners outside the period lacks specific details related to fire size and fuel type, although location is given as a six figure grid reference. During the period of the FPP from 13/03/2010 to the 8/04/2010 there were 997 private burning registrations averaging 37 per day. After the FPP ended, from the 9/04/2010 to 31/04/2010, there were a further 688 private burning registrations averaging 13 per day. The range of daily private burning registrations was 1 to 67.

The available data is insufficient to be able to comment on the contribution of private burning to air quality as the relevant fuel index cannot be calculated.

**Recommendation:**

**Refer to the recommendation for TOR 2b**

**TOR 1 f: The cost to the forest industry and PWS of implementing the CSMS in 2010**

Three CSMS users reported costs for implementing the CSMS in 2010, five reported no additional costs and three did not comment.

For comparative analysis, CSMS users' costs were spread over the total hectares of their completed programs to give a \$ per hectare figure. The costs included labour, aircraft, machinery and overheads. The costs for implementing the CSMS were reported by the three users as: \$1.00, \$2.18 and \$0.54 respectively, per ha of completed burning. This is within the range experienced in 2009.

Only 2 CSMS users reported on areas not burnt due to implementing the CSMS. These reports were treated in the same way as costs for comparison. One user missed burning opportunities at the rate of 0.01 of a hectare per hectare of their completed burns and the other at the rate of 0.05 of a hectare per hectare of their completed burns. This was about one tenth of the rate for 2009.

Over two seasons the direct cost of implementing the CSMS due to cancelled burns and the reorganisation of schedules has been minor within the broader context of silvicultural burning costs. Similarly, the loss of burning opportunity has been insignificant.

**TOR 1 g: The number and distribution of complaints about smoke relative to findings on forest industry and PWS burning activity and on air quality data**

The complaints databases for 2010, supplied by the FPA and the EPA were the sources of information. They recorded a net 82 complaints after discounting entries from the same source on the same day about the same airshed, entries which were not about CSMS burning and two entries with insufficient detail to determine an airshed of origin.

Sixty four (64) complaints related to the single smoke event in the Huon (17-20/04/2010). The complaints originated from Southport to Kingston, Hobart and the eastern shore of the Derwent River.

Complaints	SA	SH	BL	Mn	Dm	Gc	Wt	Rp	Hu
<b>No. in 2010</b>	1	7	2	0	6	2	0	0	64
<b>CI 2010</b>	1.7	24.3	20.9	0	31.8	10.3	0	0	99.4
<b>No. in 2009</b>	0	7		3	15	2	1	11	17
<b>CI 2009</b>	0	14.8		3.5	34.8	7.1	6.3	16.4	34.2
<b>No. in 2008</b>	0	2		0	38		4	13	24
<b>CI 2008</b>	0	2.8		0	11		5.6	6.7	54.4

**Table 17: Complaints and complaint incidence (CI) per airshed 2008 to 2010. CI is a comparative measure which uses complaints per 100,000 of FI**

In 2010, the CI increased in the South Arthur, Surrey Hills, Goulds Country and Huon Valley airsheds but reduced in Miena, Diddleum, Wielangta and Repulse. Brushy Lagoon is represented for the first time. Mount Tooms and West Coast are not shown as neither airshed has registered a complaint since 2008.

The low number of complaints in South Arthur, Brushy Lagoon, Diddleum and Goulds Country airsheds does not correlate with either large amounts of CSMS burning or high PM readings. Four of the seven complaints in Surrey Hills do correlate with poor air quality readings from the Emu River station on 21 & 22/04/2010. Huon complaints directly correlate with the rise and fall of the air quality readings from the Geeveston, Huonville and Judbury air quality monitoring stations between 16/04/2010 and 20/04/2010. It is notable that no complaints from Geeveston were recorded for the 16 days of persistent poor air quality from 16/05/2010 to 31/05/2010. This may be associated with an ambient level of pollution which is tolerated locally in contrast to the major event earlier which drew complaints from a wider geographical area.

The CI for the State increased from 14 in 2009 to 29 in 2010 mainly as a consequence of the Huon smoke event combined with the significant reduction in FI across the State.

A majority of complainants referred to the physical effects of smoke: smell, ash, tainting and health issues.

**TOR 1 h. The management of complaints with regard to their processing and resolution**

It was again difficult to reconcile the two data sets between the EPA and the FPA. The FPA's spreadsheet is poorly set out with inconsistent recording of information under the location heading. Some entries were duplicated and others lacked sufficient identifying information to be able to match them with the EPA's data. Only one complaint could be positively identified as being the same in both data sets which is inconsistent with complaints being routinely passed on to the FPA's data base. The EPA's database is the better format of the two for the purpose of this type of analysis.

The FPA conducted formal investigations into the two significant smoke events in the Surrey Hills and Huon valley airsheds which were the subject of detailed reports.

**TOR 2 a. Options for improving the effectiveness of the CSMS including its administrative process and technical inputs**

**(i) The determination and implementation of "No Burning" days**

The CSMS implementation plan for 2009 stated in relation to exceptional circumstances:

"Subject to the EPA being able to provide real-time monitoring by 2009, when smoke from a preceding day or days does not disperse and PM 2.5 and / or PM10 levels are at prescribed limits at 0900 then a "No Burning" day will be declared for the relevant airshed(s) unless:

the predicted Ventilation Index is above 7050,  
the predicted Inversion Height is above 1500 metres and  
the dispersion model is favourable for that day."

The flaw in this plan was the failure to spell out who was responsible for doing what.

By 2010, the EPA had 19 air quality monitoring stations established across the main regional centres of the State. These are providing real time data on air quality which can be accessed by the CSMS users and the public.

A centralised process where one authority monitors the 19 stations and makes declarations about "No Burning" is less attractive than a system which requires the users to monitor the relevant airsheds in which they intend to operate and make the determination for themselves, guided by the prescription in the implementation plan. As there are now multiple stations in some airsheds the prescription needs to be amended to read:

**"When smoke from a preceding day or days does not disperse and PM 2.5 is measured at 25 µg per m<sup>3</sup> or more at 0900 then a "No Burning" day will be declared for the relevant airshed(s).**

**Where an airshed is monitored by more than one station a "No Burning" day may apply only to the location(s) associated with the station(s) which meet the prescribed limit but only where these locations can be geographically**



**distinguished in relation to the relevant air quality monitoring station(s). Otherwise, the “No Burning” day provision will apply to the whole of the affected airshed(s) unless:**

**the predicted Ventilation Index is above 7050,  
the predicted Inversion Height is above 1500 metres and  
the smoke dispersion model or mesolaps forecast is favourable for that day.**

**The above also applies to any burning adjacent to the affected airshed(s) and / or locations which is / are predicted to impact on them.”**

The onus for decision-making in relation to the “No Burning” provisions should be with the CSMS users.

**Recommendation:**

**Responsibility for the management of “No Burning” days should be with the CSMS users who must implement the “No Burning” prescription as amended in this review.**

**(ii) Fuel Reduction Burning**

The smoke dispersion model assumes that a convection column will establish up to 1500 metres and the charts represent the smoke concentration averaged from the ground up to that height. If the top of the smoke is significantly lower or higher than 1500 metres, the conditions for dispersion may be quite different, particularly in situations where the flow of the plume is not strong i.e. upper level winds are light.

Most fuel reduction burns are done in conditions which support low level fire behaviour and intensity and the smoke dispersion model may be less useful than the surface wind model (mesolaps). Where this is the most appropriate forecast for the effects of smoke on downwind communities it should be used and recorded on the CSMS noticeboard.

**Recommendation:**

**Where smoke modelling is not appropriate for the type of burning being done and the mesolaps forecast is likely to better represent the conditions for surface smoke direction it should be used and its use recorded on the CSMS noticeboard.**

**TOR 2 b: The regulation of smoke from sources other than the forest industry**

Over the last two autumn burning seasons (2009 / 2010) the CSMS has demonstrated that it is possible to effectively regulate the amount of organised daily burning done on the basis of predicted atmospheric conditions. So far the CSMS has applied only to willing parties, the forest industry and the Parks and Wildlife Service. This group has always maintained that the discriminatory application of the CSMS ignores the impact of private burning which often occurs simultaneously due to favourable weather and is masked to some extent by the industry burning. Two reviews of the

CSMS have revealed examples of recorded poor air quality, some of which could not be attributed to industry burning and by inference were caused by either private burning or other unknown causes.

From the 13/03/2010 to the 8/04/2010, within the FPP the TFS recorded 997 registrations for private burning, averaging 37 a day within the range from 1 to 67. Between the end of the FPP on the 9/04/2010 and the end of the CSMS operating period on 31/05/2010, a further 688 voluntary registrations of private burns were recorded averaging 13 per day within the range from 1 to 43. This gives some indication of the present scale of private burning. Although the current TFS database does not provide information about fire size and fuel type, fire locations are available from a 6 figure grid reference.

When the FPP ended a significant number of the public continued to provide much of the information which would be needed for inclusion within the CSMS. The only additional requirement is fire size and fuel type, the two questions which can deliver the FI.

Because of the random nature of private burning and potentially high number of daily registrations, including it within the CSMS requires a different approach to that taken with the more organised corporate burning. Private burning input to the CSMS will need to be coordinated through the TFS acting as an additional CSMS user.

The majority of registrations in 2010 (> 92%) were for burns which were registered and conducted throughout the same day. This precludes the TFS being in a position to bid for an allocation in the normal way. To overcome this it is proposed to give the TFS a standing daily allocation for each airshed. Initially, in the absence of supporting data, this should be equivalent to 15% of the gross daily airshed allocation after the FI60 component has been calculated. This means that the remaining 85% is then divided proportionally between the corporate bidders. When more is known about the amount and distribution of private burning it is likely that the standing allocation percentage will need to be varied between the airsheds with some receiving more and others less. While this may be seen as unfair to the corporate burners it needs to be considered as the initial step in a process which will allow the impact of private burning to be assessed, beginning in 2011. It also must be realised that an inevitable consequence of involving private burners is a reduction in the corporate share of the daily FI pool.

Under this proposal the TFS will be responsible for determining the favourability status of the airsheds' daily smoke model and applying the private allocation accordingly. The TFS will then have the responsibility to accept registrations up to the airsheds' capacity for private burning and refusing excess registrations on the basis of air quality. Under this system early registrants will be accommodated first which is consistent with a long term strategy to get the private burners into the habit of early registration so that it will be possible to eventually lodge the private bid component before 0800 in the normal way.

As the CSMS user, the TFS would be required to comply with the prescriptive change, recommended by this review, to "No Burning" days. This would see much of

the private burning being largely controlled, for the first time ever, on the basis of air quality.

Because of the difficulty in following up the results of private burning it is proposed initially to make the assumption that the private burning is all completed each day. It may be possible to develop an automated feedback system which can provide daily results at some point but it is not a priority in the early stages.

This proposal should be seen as a practical first step requiring a relatively small contribution of effort from the TFS and having a minimal impact on the public other than restricting some burning in some locations on some days. It can begin a process towards the integration of all private burning within the CSMS without the need for legislation in the first instance.

### **Recommendation:**

**The TFS should be asked to make the necessary changes to fire permit and fire registration data in time for the 2011 autumn burning period to enable them to participate in the CSMS as the coordinator for private burning.**

### **Acknowledgements**

This review was assisted by the willing cooperation of the forest industry and the Parks and Wildlife Service's Fire management Branch. Special thanks to Daniel Livingston (FPA), Dr. Alan Wain (BoM) John Innis (EPA) and Mark Chladil (TFS).

### **Glossary of Acronyms in order of appearance**

**PWS – Parks and Wildlife Service (Fire Management Branch)**

**CSMS – Coordinated Smoke Management Strategy**

**TOR – Terms of Reference**

**EPA – Environment Protection Authority**

**FI – Fuel Index (previously called the Fuel Weight Index)**

**F160 – Bureau of Meteorology atmospheric stability forecast**

**FPAC – Forest Practices Advisory Council**

**FPA - Forest Practices Authority**

**BoM – Bureau of Meteorology**

**TFS – Tasmania Fire Service**

**CI – Complaint Incidence**

**FPP – Fire Permit Period**

## Document Control Log Table

### Document Summary Information

<b>Document name</b>	Review of the implementation and effectiveness of the 2010 season's trial of the forest industry and Parks & Wildlife Service Coordinated Smoke Management Strategy
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### Version Control

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1.0	27/09/2010	Richard Chuter	
1.1	18/01/11	Chris Grove	Added version number, Trim record, page numbers and doc control tables.  Note: The wording of this document is identical to that approved by the FPA Board on 27/09/2010, except for the document control information.

### Stages required for release outside FPA

Category of advice		C
Stages	Required/not required	Completed (date)
Specialist	Not required	
Line Manager	Not required	
Peer/FPO/stakeholder review	Not required	
CFPO	Required	27/09/2010
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