

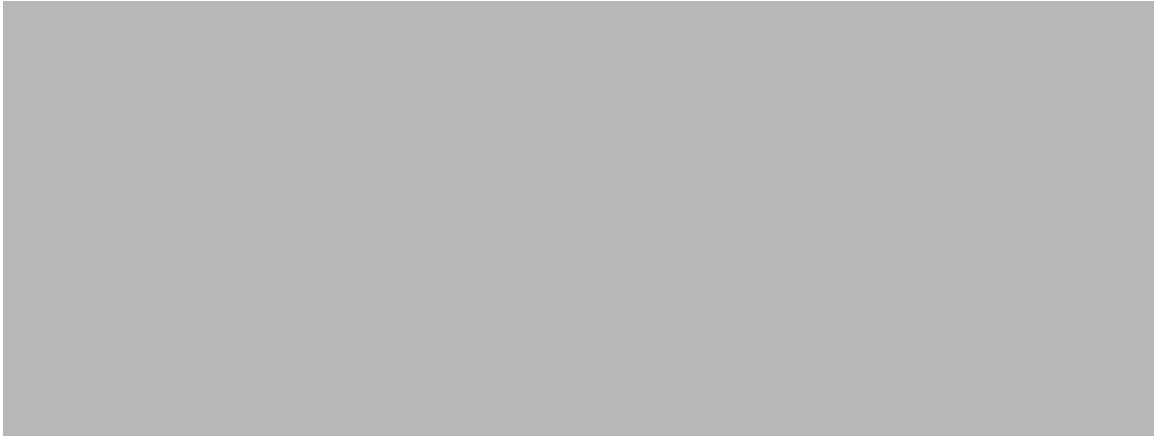
Report on Flood Forecast/Warning Performance Analysis



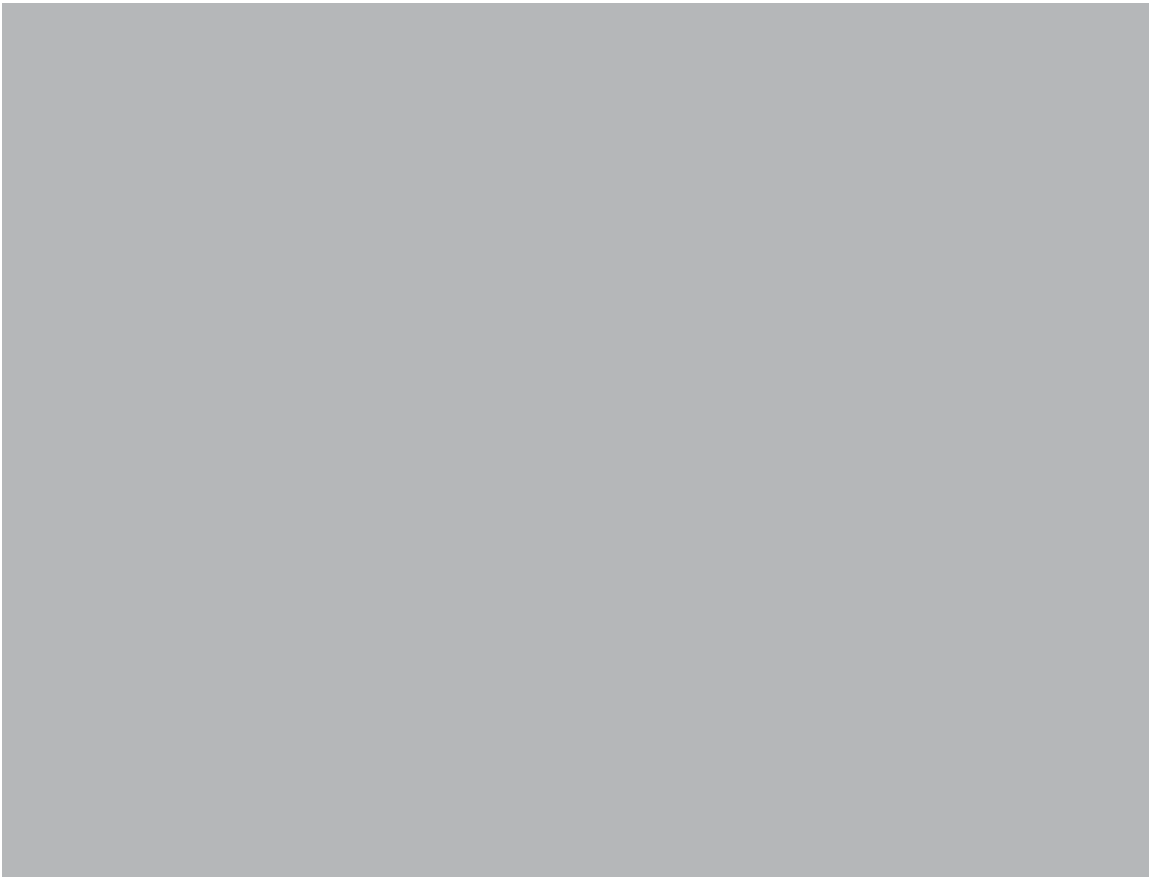
May 2014

1. Introduction

Post event/season FFW performance analysis is an important activity in assessing and improving FFW services.



In this report, the analysis from **Section 5** forward is organised in the order of catchment, event, and forecast site.





5. Forecasts Analysis and Assessment - Connors-Isaac

5.1 Yatton 31 Jan - 08 Feb 2014

Assessment for target lead time:

- First warning containing both height and timing forecast for the target (Warning No 2): *Minor flood levels are expected at Yatton during Saturday evening, with further rises to the moderate flood level possible during Sunday.*
- Targeted timing for the target height (9.5m): 02/02/2014 12:00 Sunday, +/-12hr.
- Warning No 2 issue time: 31/01/2014 20:52 Fri.
- Actual time when flood levels reached the target height 9.5m: 02/02/2014 12:00 Sunday.
- Actual forecast lead time: 39hr (14hr longer than the targeted lead time, well met the lead time target).

Table 5.1 Forecasts accuracy assessment for for Yatton for the 31 Jan - 08 Feb event.

	Number of warnings/forecasts	Forecast success rate
Total number of warnings issued	20	
Number of qualitative or quantitative forecast included in analysis	11	
Number of forecast met target range (height)	4	36%
Number of forecast met target range (time)	10	91%

5.2 Yatton 10-16 Feb 2014

Assessment for target lead time:

- First warning containing both height and timing forecast for the target (Warning No 1): *River levels will exceed the minor flood level (7.5 metres) late Monday and the moderate flood level (9.5 metres) on Tuesday.*
- Targeted timing: 11/02/2014 12:00 Tuesday, +/-12hr.
- Warning No 1 issue time: 10/02/2014 08:37 Mon.
- Actual time when flood levels reached the target height 9.5m: 11/02/2014 06:00 Tuesday.
- Actual forecast lead time: 22.5hr (1.5hr short of the targeted lead time, but within the timing error range).

Table 5.2 The assessment results for forecasts for Yatton for the 10 Jan - 16 Feb event.

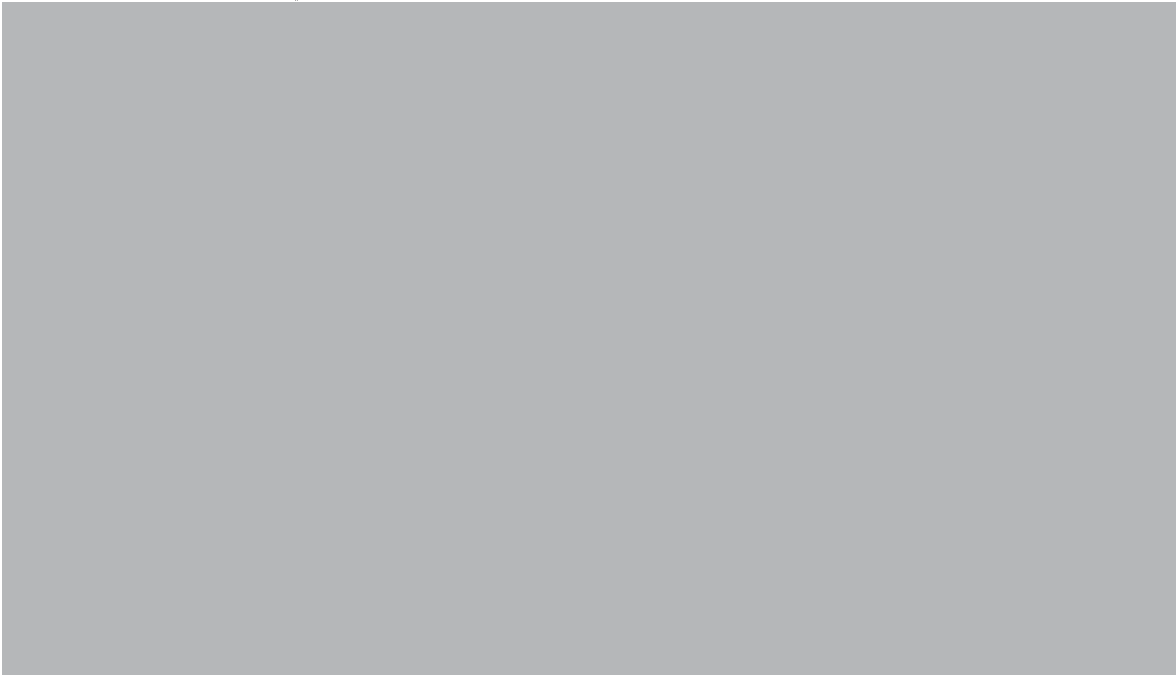
	Number of warnings/forecasts	Forecast success rate

Report on Flood Forecast Warnings Performance Analysis

Total number of warnings issued	10	
Number of qualitative or quantitative forecast included in analysis	5	
Number of forecast met target range (height)	5	100%
Number of forecast met target range (time)	4	80%



6. Forecasts Analysis and Assessment - Cooper



6.1 Cooper 9-18 Jan 2014

➤ Retreat (Retreat TM)

Assessment for target lead time:

- First warning containing qualitative forecast for the target (Warning No 2):
The moderate flood level is expected to be exceeded early next week, with rises to around 5 metres possible.
- Targeted timing: 14/01/2014 00:00 Tuesday (or mid-night Monday), +/-24hr.
- Warning No 2 issue time: 10/01/2014 10:21 AM Friday.
- Actual time when flood levels reached the target height 4.5m: 13/01/2014 21:00 Monday.
- Actual forecast lead time: **3 days and 10.5hr (13.5hr short of the targeted lead time, but within the timing error range).**



Table 6.1.1 Forecasts accuracy assessment for for Retreat for the 09 - 18 Jan event.

	Number of warnings/forecasts	Forecast success rate
Total number of warnings issued	12	

Number of qualitative or quantitative forecast included in analysis	3	
Number of forecast met target range (height)	0	0%
Number of forecast met target range (time)	3	100%

➤ Windorah

Assessment for target lead time:

- First warning containing qualitative forecast for the target height (Warning No 5): *Minor flood levels expected later in the week, with moderate flood levels possible.*
- Targeted timing: 14/01/2014 00:00 Friday (or mid-night Thursday), +/-24hr.
- Warning No 5 issue time: 12/01/2014 10:07 AM Sunday.
- Actual time when a flood peak reached: (3.77m – below moderate) 15/01/2014 21:00 Monday.
- Actual forecast lead time: 3 days and 11hr (11hr longer than the target lead time, well met the targeted lead time).

Table 6.1.2 Forecasts accuracy assessment for for Windorah for the 09 - 18 Jan event .

	Number of warnings/forecasts	Forecast success rate
Total number of warnings issued	12	
Number of qualitative or quantitative forecast included in analysis	3	
Number of forecast met target range (height)	3	100%
Number of forecast met target range (time)	3	100%

6.2 Cooper 19 Feb -10 Mar 2014

➤ **Retreat (Retreat TM)**

Assessment for target lead time:

- First warning containing qualitative forecast for the target height (Warning No 22): *River level rises above the minor flood level are expected over the next few days.*
- Targeted timing: 05/03/2014 12:00 Wednesday (mid-day Wednesday), +/- 1 day.
- Warning No 22 issue time: 03/03/2014 10:53 AM Monday.
- Actual time when flood peak reached: (3.416m – below minor) 07/03/2014 22:00 Monday.
- Actual forecast lead time: 4 days and 11hr (lead time does not apply in this case, as the food levels were below the targeted moderate flood level of 4.5m).

Table 6.2.1 Forecasts accuracy assessment for for Retreat for the 19 Feb -10 Mar event.

	Number of warnings/forecasts	Forecast success rate
Total number of warnings issued	29	
Number of qualitative or quantitative forecast included in analysis	3	
Number of forecast met target range (height)	1	33%
Number of forecast met target range (time)	2	67%

Note: There was a moderate flood peak 4.572m recorded at Retreat TM at 20:00 on 24/02/2014. However, no warnings/forecasts found for this flood peak.

Table 6.2.2 Forecasts accuracy assessment for for Windorah for the 19 Feb -10 Mar event.

	Number of warnings/forecasts	Forecast success rate
Total number of warnings issued	29	
Number of qualitative or quantitative forecast included in analysis	5	
Number of forecast met target range (height)	4	80%
Number of forecast met target range (time)	4	80%



7. Forecasts Analysis and Assessment - Daintree

Two flood events occurred. Daintree Village is the only qualitative forecast site.

7.1 Daintree Village 3-4 Feb 2014

Assessment for target lead time:

- First warning containing qualitative forecast for the target height (Warning No 2):
Exceed the moderate flood level within the next 3 hours, based on rainfall already recorded. Possibly exceed the major flood level, dependent on the intensity of the forecast rainfall.
- Targeted timing: 04/02/2014 01:33 AM Tuesday, +/-1.5hr.
- Warning No 2 issue time: 04/02/2014 00:03 AM Tuesday.
- Actual time when a flood peak was recorded: A peak just reached the moderate flood level of 6m was recorded at 8:00am on 04/02/2014, which is below the target height.
- Actual forecast lead time (for the peak): **8hr (2hr longer than the target lead time 6hr met the lead time target. The forecast height is higher than actually recorded, which is acceptable. However, the timing in the forecast had only less than 3hr lead time).**

Table 7.1 Forecasts accuracy assessment for for Daintree Village for the 09 - 18 Jan event.

	Number of warnings/forecasts	Forecast success rate
Total number of warnings issued	10	
Number of qualitative or quantitative forecast included in analysis	6	
Number of forecast met target range (height)	1	17%
Number of forecast met target range (time)	0	0%

7.2 Daintree Village 8-9 Feb 2014

Assessment for target lead time:

- First warning containing qualitative forecast for the target height (Warning No 1):

Minor flood levels are falling but renewed rises above the moderate flood level (6m) possible by Sunday morning.

- Targeted timing: 09/02/2014 09:00 AM Saturday, +/-3hr.
- Warning No 1 issue time: 08/02/2014 09:38 AM Saturday.
- Actual time when a flood peak was recorded: A minor flood peak of 5.35m was recorded at 06:30am on 09/02/2014, which is far below the target height.
- Actual forecast lead time (for the peak): 21hr (15hr earlier than the target lead time 6hr. Forecast is acceptable, given the forecast was higher and earlier than actual recorded).



Table 7.2 Forecasts accuracy assessment for for Daintree Village for the 8-9 Feb event.

	Number of warnings/forecasts	Forecast success rate
Total number of warnings issued	5	
Number of qualitative or quantitative forecast included in analysis	4	
Number of forecast met target range (height)	0	0%
Number of forecast met target range (time)	0	0%



8. Forecasts Analysis and Assessment - Don



8.1 Don 8-9 Feb 2014

Assessment for target lead time:

- First warning containing qualitative forecast for the target height (Warning No 1):
Minor flood peak around 3.5 metres by 8am Sunday.
- Targeted timing: 10/02/2014 08:00 AM Sunday, -3hr.
- Warning No 1 issue time: 09/02/2014 03:52 AM Sunday.
- Actual time when flood levels peaked: A peak of 1.65m was recorded at 15:40pm on 09/02/2014, which is below the target height.
- Actual forecast lead time (for the peak): 12hr (6hr earlier than the target lead time 6hr).
Forecast is acceptable, given the forecast was higher and earlier than what was actually recorded.



Table 8.1 Forecasts accuracy assessment for for Bowen Pump Station for the 8-9 Feb event.

	Number of warnings/forecasts	Forecast success rate
Total number of warnings issued	2	
Number of qualitative or quantitative forecast included in analysis	1	
Number of forecast met target range (height)	0	0%
Number of forecast met target range (time)	0	0%



9. Forecasts Analysis and Assessment - Herbert



9.1 Herbert 8-9 Feb 2014

> Gleneagle



Assessment for target lead time:

- First warning containing qualitative forecast for the target height:
(N/a, as the flood levels did not reach the target level and moderate flood levels were not forecast for this site during the event).
- Targeted timing: (N/A).
- Warning No x issue time: (N/A).
- Actual time when flood levels reached the target height 7.5m (the moderate flood level): (Moderate flood level not reached).
- Actual forecast lead time: (N/A).



Table 9.1.1 Forecasts accuracy assessment for for Gleneagle for the 8-9 Feb event.

	Number of	Forecast success
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	warnings/forecasts	rate
Total number of warnings issued	16	
Number of qualitative or quantitative forecast included in analysis	10	
Number of forecast met target range (height)	5	50%
Number of forecast met target range (time)	9	90%

➤ Abergowrie Bridge

Assessment for target lead time:

- First warning containing qualitative forecast for the target height (Warning No 4): *Rises above the minor flood level during Sunday morning, possibly reaching the moderate flood level during Sunday afternoon.*
- Targeted timing: 09/02/2014 15:00 PM Sunday, +/-3hr.
- Warning No 4 issue time: 09/02/2014 01:33 AM Sunday.
- Actual time when a flood peak reached: (9.54m – below moderate) 09/02/2014 10:29 AM Sunday.
- Actual forecast lead time: 9hr (3hr earlier than the target lead time 6hr, well met the targeted lead time; the forecast height just outside the targeted error range, but higher than actual peak recorded, which is acceptable).

Table 9.1.2 Forecasts accuracy assessment for for Abergowrie Bridge for the 8-9 Feb event.

	Number of warnings/forecasts	Forecast success rate
Total number of warnings issued	16	
Number of qualitative or quantitative forecast included in analysis	7	
Number of forecast met target range (height)	6	86%
Number of forecast met target range (time)	7	100%

➤ Ingham Pump Station

Assessment for target lead time:

- First warning containing qualitative forecast for the target height (Warning No 1): ... minor to moderate flooding can be expected in the lower Herbert River by early Sunday.
- Targeted timing: 09/02/2014 03:00 AM Sunday, -3hr.
- Warning No 1 issue time: 08/02/2014 08:40 AM Saturday.
- Actual time when a flood level/peak reached or close to the target height: (9.575m* – peak below minor) 09/02/2014 17:00 PM Sunday.
- Actual forecast lead time: 1 day and 10hr (1 day and 4hr earlier than the target lead time 6hr, well met the targeted lead time, the actual peak was lower than the targeted height of 10m and was just below the lower error range, the forecast is acceptable given the forecast time and height were reasonably earlier and higher than that actually recorded).

*Note: This is the peak recorded at the TM station. The Alert station recorded a slightly lower peak of 9.54m at 16:12pm.

Table 9.1.3 Forecasts accuracy assessment for for Ingham Pump Station for the 8-9 Feb event.

	Number of warnings/forecasts	Forecast success rate
Total number of warnings issued	16	
Number of qualitative or quantitative forecast included in analysis	2	
Number of forecast met target range (height)	0	0%
Number of forecast met target range (time)	2	100%

> Gairloch

Assessment for target lead time:

- First warning containing qualitative forecast for the target height (Warning No 1): ... minor to moderate flooding can be expected in the lower Herbert River by early Sunday.
- Targeted timing: 09/02/2014 03:00 AM Sunday, -3hr.
- Warning No 1 issue time: 08/02/2014 08:40 AM Saturday.
- Actual time when a flood level/peak reached or close to the target height: (8.95m – peak below minor) 09/02/2014 15:22 PM Sunday.
- Actual forecast lead time: 1 day and 9hr (1 day and 3hr earlier than the target lead time 6hr, well met the targeted lead time, the forecast is acceptable given the

forecast time and height were reasonably earlier and higher than that actually recorded.

Table 9.1.4 Forecasts accuracy assessment for for Gairloch for the 8-9 Feb event.

	Number of warnings/forecasts	Forecast success rate
Total number of warnings issued	16	
Number of qualitative or quantitative forecast included in analysis	3	
Number of forecast met target range (height)	0	0%
Number of forecast met target range (time)	3	100%

➤ Halifax

Assessment for target lead time:

- First warning containing qualitative forecast for the target height (Warning No 7): *Moderate flooding later Sunday evening, possibly higher levels and major flooding.*
- Targeted timing: 09/02/2014 21:00 PM Sunday, +/-3hr.
- Warning No 7 issue time: 09/02/2014 11:56 AM Sunday.
- Actual time when a flood level/peak reached or close to the target height: (5.02m – a major flood peak) 09/02/2014 16:42 PM Sunday.
- Actual forecast lead time: 5hr (4hr short of the target lead time 9hr for the target height, and out of the targeted time error range, unacceptable).

Table 9.1.5 Forecasts accuracy assessment for for Halifax for the 8-9 Feb event.

	Number of warnings/forecasts	Forecast success rate
Total number of warnings issued	16	
Number of qualitative or quantitative forecast included in analysis	2	
Number of forecast met target range (height)	2	100%
Number of forecast met target range	2	100%

(time)		
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10. Forecasts Analysis and Assessment - Johnstone

10.1 Johnstone 3-4 Feb 2014

➤ Mourilyan

Assessment for target lead time:

- First warning containing forecast for the target height (Warning No 1):
Rises to 8.0 metres during Monday morning (minor flood level).
- Targeted timing: 03/02/2014 09:00 AM Monday, +/-3hr.
- Warning No 1 issue time: 03/02/2014 7:40 AM Monday.
- Actual time when a flood peak reached: (7.37m – peak below minor) 03/02/2014 12:23 PM Monday.
- Actual forecast lead time: 5hr (met the targeted lead time range; the forecast height was reasonably higher than recorded).

Table 10.1.1 Forecasts accuracy assessment for for Mourilyan for the 3-4 Feb event.

	Number of warnings/forecasts	Forecast success rate
Total number of warnings issued	5	
Number of qualitative or quantitative forecast included in analysis	2	
Number of forecast met target range (height)	0	0%
Number of forecast met target range (time)	1	50%

➤ McAvoy Bridge

Assessment for target lead time:

- First warning containing qualitative forecast for the target height (Warning No 1): *Rise to 6.1 metres during Monday morning (moderate flood level).*
- Targeted timing: 03/02/2014 09:00 AM Monday, +/-3hr.
- Warning No 1 issue time: 03/02/2014 7:40 AM Monday.
- Actual time when a flood level reached the forecast level: (6.103m – moderate flood level, not peak) 03/02/2014 07:49 AM Monday.
- Actual forecast lead time: <1hr (3hr short of the target lead time of 3-6hr, not acceptable).

Table 10.1.2 Forecasts accuracy assessment for for McAvoy Bridge for the 3-4 Feb event.

	Number of warnings/forecasts	Forecast success rate
Total number of warnings issued	5	
Number of qualitative or quantitative forecast included in analysis	4	
Number of forecast met target range (height)	4	100%
Number of forecast met target range (time)	3	75%

➤ Innisfail

Assessment for target lead time:

- First warning containing qualitative forecast for the target height (Warning No 1): *Rises to 5.0 metres during Monday morning (minor flood level).*
- Targeted timing: 03/02/2014 09:00 AM Monday, +/-3hr.
- Warning No 1 issue time: 03/02/2014 7:40 AM Monday.
- Actual time when a closest flood level reached: (4.89m – flood peak below minor) 03/02/2014 11:39 AM Monday.
- Actual forecast lead time: 4hr (2hr short of the target lead time of 6hr; however, as the flood level did not reach the target level, it is acceptable).

Table 10.1.2 Forecasts accuracy assessment for for Innisfail for the 3-4 Feb event.

	Number of warnings/forecasts	Forecast success rate
Total number of warnings issued	5	
Number of qualitative or quantitative forecast included in analysis	2	
Number of forecast met target range (height)	2	100%
Number of forecast met target range (time)	2	100%

10.2 Johnstone 8-9 Feb 2014

A total of 4 warnings were issued for this event.

➤ Mourilyan

Assessment for target lead time:

- First warning containing forecast for the target height (Warning No 1):
Reach 8.0 metres (minor flood level) late Saturday night.
- Targeted timing: 08/02/2014 21:00 PM Saturday, +/-3hr.
- Warning No 1 issue time: 08/02/2014 17:40 PM Saturday.
- Actual time when a flood peak reached: (7.52m – peak below minor) 08/02/2014 23:06 PM Monday.
- Actual forecast lead time: 5hr (met the targeted lead time range, the forecast height was reasonably higher than recorded).

Table 10.2.1 Forecasts accuracy assessment for for Mourilyan for the 8-9 Feb event.

	Number of warnings/forecasts	Forecast success rate
Total number of warnings issued	4	
Number of qualitative or quantitative forecast included in analysis	3	
Number of forecast met target range (height)	0	0%
Number of forecast met target range (time)	2	67%

➤ McAvoy Bridge

Assessment for target lead time:

- First warning containing qualitative forecast for the target height (Warning No 1): *Reach 5.0 metres (minor flood level) during Saturday evening.*
- Targeted timing: 08/02/2014 18:00 PM Saturday, +/-3hr.
- Warning No 1 issue time: 08/02/2014 17:40 PM Saturday.
- Actual time when a flood level reached the forecast level: (5.003 – minor flood level, not peak) 08/02/2014 17:58 AM Saturday.
- Actual forecast lead time: **1hr (3hr short of the target lead time of 3-6hr, not acceptable).**

Table 10.2.2 Forecasts accuracy assessment for for McAvoy Bridge for the 8-9 Feb event.

	Number of warnings/forecasts	Forecast success rate
Total number of warnings issued	4	
Number of qualitative or quantitative forecast included in analysis	2	
Number of forecast met target range (height)	2	100%
Number of forecast met target range (time)	2*	100%

**Note: Although the timing was within the error range, flood levels had already peaked and started falling by the time Warning 2 was issued, which forecast "Reach around 5.5 metres during Saturday evening".*

➤ Innisfail

Assessment for target lead time:

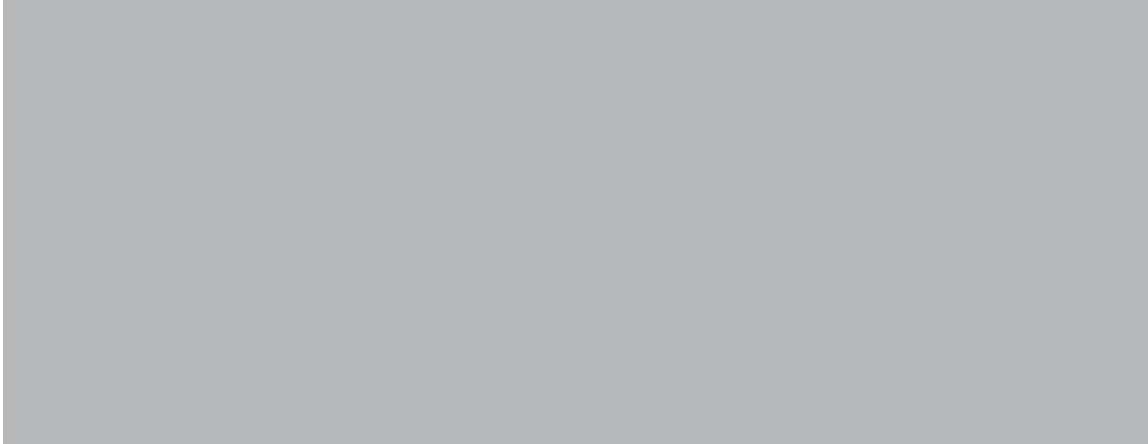
- First warning containing qualitative forecast for the target height: N/A
River levels are forecast to remain below the minor flood level.
- Targeted timing: N/A.
- Warning No 1 issue time: 08/02/2014 17:40 PM Saturday.
- Actual time when a closest flood level reached: N/A, as both forecast and recorded river levels did not reach the target height.
- Actual forecast lead time: N/A.

Table 10.2.3 Forecasts accuracy assessment for for Innisfail for the 3-4 Feb event.

	Number of warnings/forecasts	Forecast success rate
Total number of warnings issued	4	
Number of qualitative or quantitative forecast included in analysis	0	
Number of forecast met target range (height)	N/A	N/A
Number of forecast met target range (time)	N/A	N/A



11. Forecasts Analysis and Assessment - Mulgrave-Russell



11.1 Mulgrave-Russell 8-9 Feb 2014



> Gordonvale

Assessment for target lead time:

- First warning containing qualitative forecast for the target height (Warning No 1): N/A, as all the warning heights are below the target height of 14m.
- Targeted timing: N/A.
- Warning No 1 issue time: 08/02/2014 08:49 AM Saturday.
- Actual time when flood levels peaked: N/A (peaked at 11.4m - below the minor flood level of 12m).
- Actual forecast lead time (for the peak): N/A.



Table 11.1 Forecasts accuracy assessment for for Bowen Pump Station for the 8-9 Feb event.

	Number of warnings/forecasts	Forecast success rate
Total number of warnings issued	5	
Number of qualitative or quantitative forecast included in analysis	2	
Number of forecast met target range (height)	0	0%
Number of forecast met target range (time)	0	0%



12. Forecasts Analysis and Assessment - Murray

Based on the directive, forecast target for Murray Flats:

- Targeted forecast height: **7.5m** (moderate flood level)
- Targeted lead time: **6 hours**.

12.1 Murray Flats 7-11 Feb 2014

Assessment for target lead time:

- First warning containing qualitative forecast for the target height (Warning No 2):
Moderate flood levels are expected overnight Friday.
- Targeted timing: 08/02/2014 00:00 AM, Saturday +/-6hr.
- Warning No 2 issue time: 07/02/2014 21:02 AM Saturday.
- Actual time when flood levels reached the forecast level: Reached 7.5m at 19:40 PM on 8/02/2014.
- Actual forecast lead time (for the target height): 23hr **(17hr earlier than the target lead time, well met the targeted lead time)**.

Table 12.1 Forecasts accuracy assessment for for Murray Flats for the 7-11 Feb event.

	Number of warnings/forecasts	Forecast success rate
Total number of warnings issued	21	
Number of qualitative or quantitative forecast included in analysis	9	
Number of forecast met target range (height)	8	89%
Number of forecast met target range (time)	8	89%

13. Forecasts Analysis and Assessment - Norman

13.1 Normanton 7-11 Feb 2014

Assessment for target lead time:

- First warning containing qualitative forecast for the target height (Warning No 2):
River level rises to around moderate flood levels during Saturday night from Glenore-Weir downstream.
- Targeted timing: 08/02/2014 21:00 PM, Saturday +/-3hr.
- Warning No 2 issue time: 08/02/2014 10:00 AM Saturday.
- Actual time when flood levels reached the forecast level: Reached a minor flood peak of 3.25m at 15:45 PM on 09/02/2014.
- Actual forecast lead time (for the target height): 1 day and 5hr **[19hr short of the target lead time, given that the forecast flood level was higher than actually occurred, the lead time is considered acceptable].**

Table 13.1 Forecasts accuracy assessment for for Murray Flats for the 7-11 Feb event.

	Number of warnings/forecasts	Forecast success rate
Total number of warnings issued	11	
Number of qualitative or quantitative forecast included in analysis	5	
Number of forecast met target range (height)	4	80%
Number of forecast met target range (time)	3	60%

14. Summary

The assessment results are summarised in Table 14.



Table 14 Summary of assessment results.

Catchment	Forecast Site		Forecast Target (SLA)		Event		Target Lead Time Assessment			Forecast Accuracy Assessment		
	Site Name	Quantitative /Qualitative	Height	Lead Time	Event	Total Number of Warnings Issued	Actual Lead Time	Met Target? (Yes/No)	Number of Forecasts Assessed	Met Height Range	Met Timing Range	
Comors-Isaac	Yatton	Qualitative	9.5m (mod)	24hr	31 Jan - 08 Feb 2014	20	39hr	Yes	11	4 (36%)	10 (91%)	
					10 - 08 Feb 2014	10	22.5hr	Yes (within error range)	5	5 (100%)	4 (80%)	
Cooper	Retreat TM	Quantitative	4.5m (mod)	4day	9-18 Jan 2014	12	3 days and 11hr	Yes (within error range)	3	0 (0%)	3 (100%)	
					19 Feb - 10 Mar 2014	29	N/A (Peak < minor)	N/A (Peak < minor)	3	1 (33%)	2 (67%)	
					9-18 Jan 2014	12	3 days and 11hr	Yes	3	3 (100%)	3 (100%)	
					19 Feb - 10 Mar 2014	29	20hr	No	5	4 (80%)	4 (80%)	
Daintree	Daintree Village	Qualitative	9.0m (maj)	6hr	3-4 Feb 2014	10	8hr	Yes	6	4 (17%)	0 (0%)	
					8-9 Feb 2014	5	21hr	Yes	4	0 (0%)	0 (0%)	
					Don 8-9 Feb 2014	2	12hr	Yes	0	N/A	N/A	
					8-9 Feb 2014	16	N/A (Peak < mod)	N/A	10	5 (50%)	5 (50%)	
Herbert	Abergowie Bdg	Qualitative	10.0m (mod)	6hr	8-9 Feb 2014	16	9hr	Yes	7	6 (86%)	7 (100%)	
					8-9 Feb 2014	16	1day and 10hr	Yes	2	0 (0%)	2 (100%)	
					8-9 Feb 2014	16	1day and 9hr	Yes	3	0 (0%)	3 (100%)	
					8-9 Feb 2014	16	5hr	No	2	2 (100%)	2 (100%)	
					3-4 Feb 2014	5	5hr	Yes	2	0 (0%)	1 (50%)	
					8-9 Feb 2014	4	5hr	Yes	3	0 (0%)	2 (67%)	
					3-4 Feb 2014	5	<1hr	No	4	4 (100%)	3 (75%)	
					8-9 Feb 2014	4	<1hr	No	2	2 (100%)	2 (100%)	
Johnstone	McAvoy Bridge	Quantitative	5.0m (minor)	3-6hr	3-4 Feb 2014	5	4hr	Yes (within error range)	2	2 (100%)	2 (100%)	
					8-9 Feb 2014	4	N/A (Peak < minor)	N/A	0	N/A	N/A	
					8-9 Feb 2014	5	N/A	N/A	0	N/A	N/A	
					8-9 Feb 2014	5	N/A (Peak < minor)	N/A	0	N/A	N/A	
Mulgrave-Russell	Gordonvale	Quantitative	14.0m (maj)	6hr	8-9 Feb 2014	5	5	Yes	9	8 (89%)	8 (89%)	
					7-11 Feb 2014	5	23hr	No (but acceptable)	5	4 (80%)	3 (60%)	
Murray	Murray Flats	Qualitative	7.5m (mod)	6hr	7-11 Feb 2014	11	1 day and 5hr	Yes	5	4 (80%)	3 (60%)	
Norman	Normanton	Quantitative	4.0m (mod)	2day	7-11 Feb 2014	11	1 day and 5hr	No (but acceptable)	5	4 (80%)	3 (60%)	
Summary	17 Sites				24 Site-Event	134		Yes - 14; No - 5; N/A - 5	91	54 (59%)	57 (63%)	



NSW Fire Weather Post Season Meeting 2013/2014 Minutes

Meeting Information

Time/Date	10am-12pm, Monday 19 th May 2014
Location	[REDACTED]
Objective	Post 13-14 season meeting to discuss NSW fire weather service.
Attendees	[REDACTED]

Agenda

Item 1	[REDACTED] Fire Weather Warning verification statistics Performance of the gridded data Feedback from NSW RFS
Item 2	[REDACTED]
Item 3	[REDACTED]
Item 4	[REDACTED]
Item 5	[REDACTED]
Item 6	[REDACTED]
Item 7	[REDACTED]
Item 8	[REDACTED]

[REDACTED]



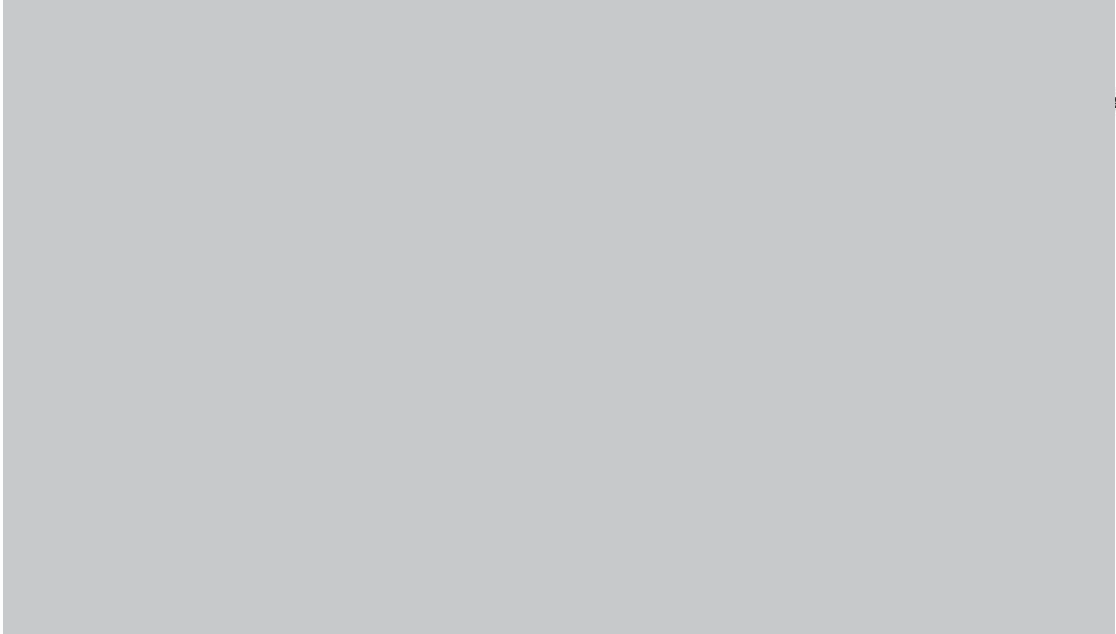

Item 1 Summary of the 2013/2014 season



Fire Weather Warnings verified with a Probability of detection on 59% (close to the long term average). The false alarm rate of 20% was historically low and a good result.

There has been no trend in verification suggesting a decreased skill in Fire Weather Warning detection since the move towards assessing ratings spatially. This is a significant achievement as many of the fire weather warnings for western NSW that were 'easy' forecasts and often verified have been reduced.

The BoM although pleased with the results is looking to continually improve and feels that the spatial depiction of fire danger is depicting a more realistic threat across the landscape.



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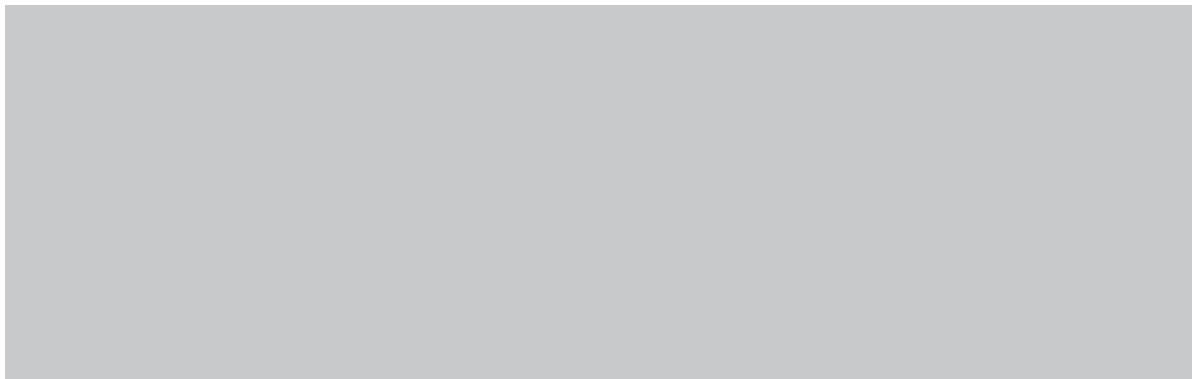
ACT Fire Weather Post Season Meeting 2013/2014 Minutes

Meeting Information

Time/Date	1-3pm, Tuesday 13 th May 2014
Location	[REDACTED]
Objective	Post 13-14 season meeting to discuss ACT fire weather service.
Attendees	[REDACTED]

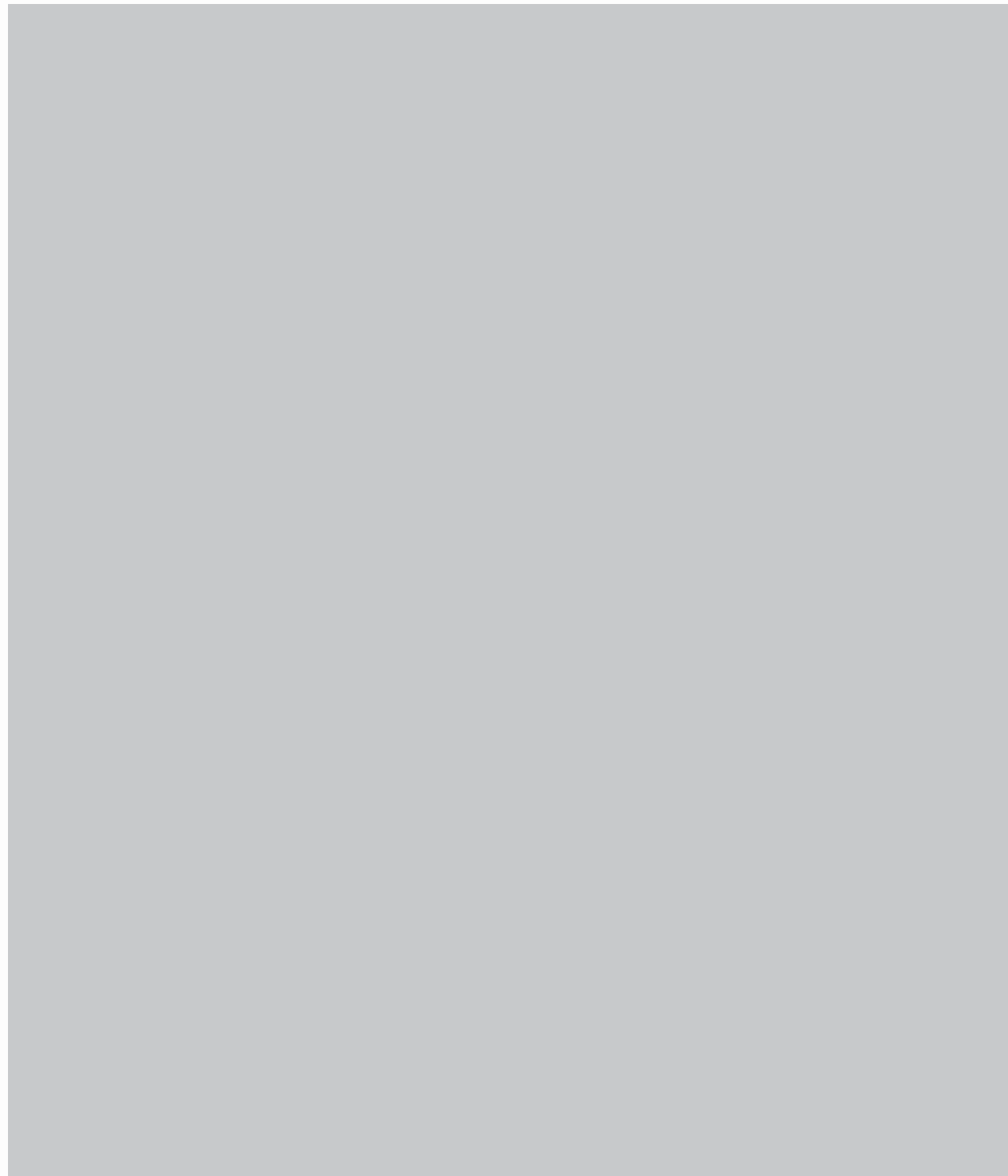
Agenda

Item 1	[REDACTED] Fire Weather Warning verification statistics Feedback from ACT BFS
Item 2	[REDACTED]
Item 3	
Item 4	
Item 5	
Item 6	
Item 7	
Item 8	
Item 9	





Verification statistics for the ACT Fire Weather Warning Service: Probability of Detection = 100%, False Alarm Rate = 33%, based on 6 warnings and 4 observed Severe Fire Weather Warning days.





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NSW & ACT

SEVERE THUNDERSTORM

REPORT

...DRAFT


2013/2014

BUREAU OF METEOROLOGY

**NEW SOUTH WALES REGIONAL OFFICE
SEVERE WEATHER SECTION**

June 2014

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3. The Severe Thunderstorm Warning Service

Performance of the Severe Thunderstorm Warning Service during 2013/2014

Severe Thunderstorm Warnings are verified using two standard indicators:

- Probability of Detection (POD), and

- False Alarm Rate (FAR).

The POD is the fraction of severe thunderstorm events that are preceded by a Severe Thunderstorm Warning. The FAR is the fraction of warnings that are *not* followed by subsequent reports of severe thunderstorms.

Mathematically the indicators are defined as follows.

If

X denotes the number of severe storms reported for which a warning was issued (and the storm occurred within the warning region);

Y denotes the number of storms for which a warning was not issued;

Z denotes the number of warnings that were issued for which no subsequent severe storm was reported;

$$POD = \frac{X}{X + Y} = \frac{\text{number of warned events}}{\text{total number of events}}$$

$$FAR = \frac{Z}{X + Z} = \frac{\text{number of unverified forecasts}}{\text{total number of forecasts}}$$

Ideally $POD = 1$ and $FAR = 0$. A perfect service is very difficult to achieve, since attempts to increase the POD tend to increase the FAR as well. The Bureau of Meteorology targets are currently for a POD of 0.70 or greater and a FAR of 0.40 or less.

Severe Thunderstorm Warnings – Regional



The statistics for Regional Severe Thunderstorm Warnings for 2013/2014 are as follows:

Comment [OR10]: Prelim

X (Number of warned events.)	66
Y (Number of un-warned events)	13
Z (Number of unverified warnings)	390
X+Y	79
X+Z	456
POD	0.84
FAR	0.86

Table 1 Severe Thunderstorm Warning Service - NSW

	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07
Regional POD	0.49	0.57	0.69	0.68	0.64	0.55	0.81	0.77	0.72
Regional FAR	0.8	0.84	0.85	0.81	0.85	0.84	0.9	0.81	0.89

	07/08	08/09	09/10	10/11	11/12	12/13	13/14
Regional POD	0.73	0.83	0.61	0.83	0.75	0.84	0.84
Regional FAR	0.86	0.83	0.89	0.87	0.89	0.91	0.86

The POD for the 2013/2014 season was the equal highest achieved since verification commenced in 1998/1999 and exceeded the Bureau of Meteorology target, while the FAR was the lowest value achieved in the last 5 seasons, though still significantly above target.

**Detailed Severe Thunderstorm Warnings –
Sydney/Newcastle/Wollongong region and Canberra**



See Appendix 2 for a map of the detailed warning area boundaries.

The statistics for the detailed Severe Thunderstorm Warnings for 2013/2014 are as follows:

X (Number of warned events.)	14
Y (Number of un-warned events.)	5
Z (Number of unverified warnings)	55
X+Y	19
X+Z	68
POD	0.74
FAR	0.80

Table 2 Severe Thunderstorm Warning Service – Sydney/Newcastle/Wollongong and Canberra Areas

	98/99	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09
Metro POD	0.5	0.58	0.75	0.61	0.52	0.54	0.67	0.75	0.76	0.61	0.83
Metro FAR	0.56	0.77	0.83	0.8	0.87	0.85	0.8	0.9	0.82	0.79	0.85

	09/10	10/11	11/12	12/13	13/14
Metro POD	0.48	0.83	0.58	0.83	0.74
Metro FAR	0.77	0.86	0.85	0.91	0.80

The Probability Of Detection, (POD), for detailed severe thunderstorm warnings for Sydney/Newcastle/Wollongong and Canberra, was lower than the previous season but still above target. The false alarm rate (FAR) was the lowest over the last 4 seasons.

Detailed analysis:

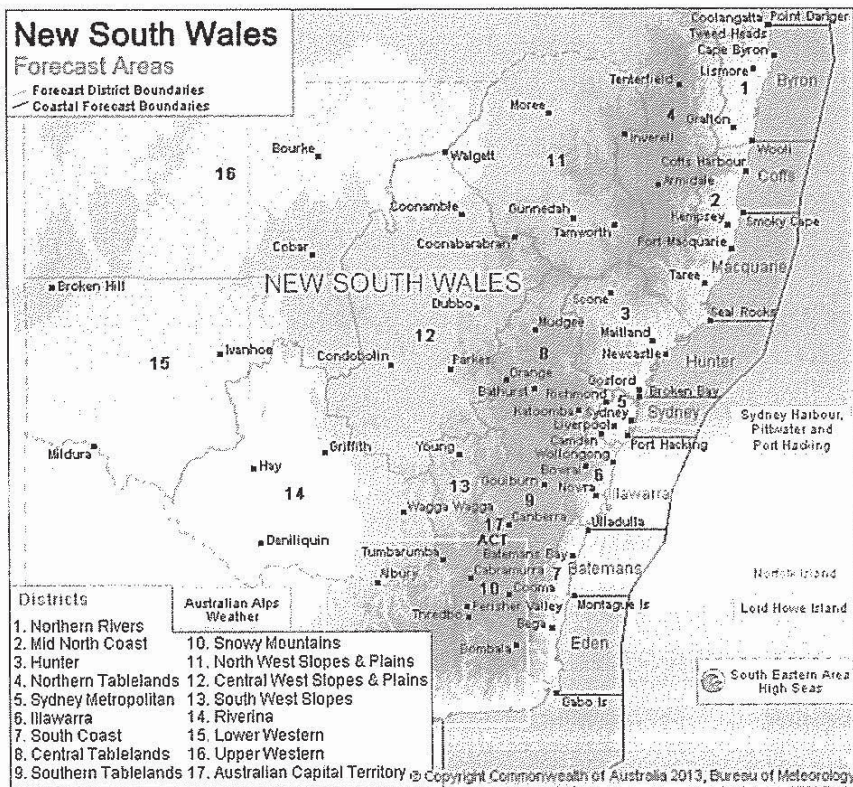
Below is a summary of key points that arose from a detailed analysis of the Severe Thunderstorm Warning Service provided for cell based warning areas.

Key points:

- There were five severe thunderstorm events reported within the cell based warning area that were not covered by either a regional or detailed severe thunderstorm warning.
- Of these events, two were of hail reports from storm spotters received post event and were just above threshold, one was for heavy rainfall and/or flash flooding, and the other two were for wind, and a short-lived tornado at Hornsby.
- There were fourteen other instances of severe thunderstorm reports within the detailed warning area, which were covered by detailed warnings, with an average lead time of 76 minutes.

Appendix 1 - NSW Forecast Districts

Figure 1 NSW Forecast Districts for Severe Thunderstorm Warnings.



Appendix 2 - Boundaries of Greater Metropolitan Warnings

Figure 2 Sydney/Newcastle/Wollongong Region Warning Areas.



Area covered by Detailed Severe Thunderstorm Warnings for Canberra:

These more detailed warnings are issued for people in Canberra and suburbs and Queanbeyan.

Major localities in the area include

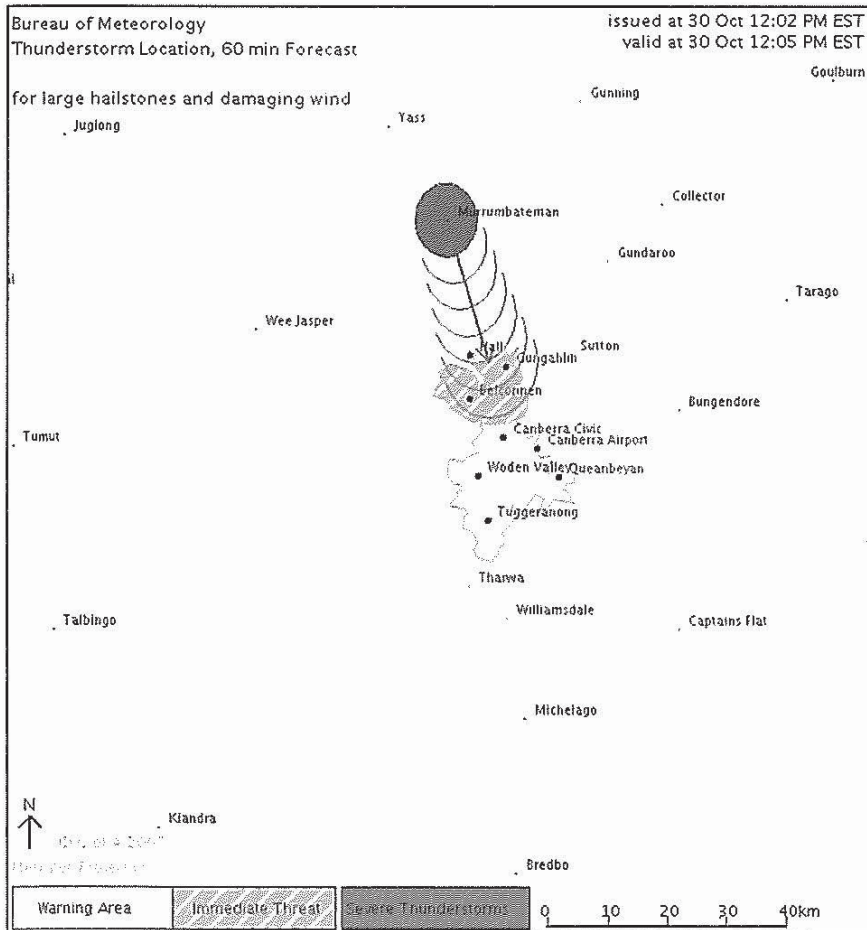
- *Canberra Central*
- *Belconnen*
- *Gungahlin*
- *Woden Valley*
- *Weston Creek*
- *Tuggeranong*
- *Queanbeyan*

The following suburbs and localities are covered

- *Canberra Central*: Acton, Ainslee, Barton, Braddon, Campbell (and Duntroon), Capitol Hill, Civic (City Centre), Deakin, Dickson, Downer, Forrest, Fyshwick, Griffith (and Manuka), Hackett, Kingston, Lyneham, Narrabundah, O'Conner, Parkes, Red Hill, Reid, Russell, Turner, Watson, Yarralumla
- *Belconnen*: Aranda, Belconnen (and Belconnen Town Centre), Bruce, Charnwood, Cook, Dunlop, Emu Ridge, Evatt, Florey, Fraser, Flynn, Giralang, Hawker, Higgins, Holt, Kaleen, Latham, Lawson, Macgregor, Macquarie, McKellar, Melba, Page, Scullin, Spence, Weetangera
- *Gungahlin*: Amaroo, Crace, Forde, Franklin, Gungahlin (and Gungahlin Town Centre), Harrison, Mitchell, Ngunnawal, Nicholls, Palmerston
- *Woden Valley*: Chifley, Curtin, Garran, Hughes, Farrer, Isaacs, Lyons, Mawson, O'Malley, Pearce, Phillip (and Woden Town Centre and Swinger Hill), Torrens
- *Weston Creek*: Chapman, Duffy, Fisher, Holder, Rivett, Stirling, Waramanga, Weston
- *Tuggeranong*: Banks, Bonython, Calwell, Chisholm, Conder, Fadden, Gilmore, Gordon, Gowrie, Greenway (and Tuggeranong Town Centre), Isabella Plains, Kambah, Macarthur, Monash, Oxley, Richardson, Theodore, Wanniasa
- *Queanbeyan City Council*: Carwoola, Dodsworth, Jerrabomberra, Karabah (and de Salis), Letchworth, Queanbeyan, Ridgeway
- Canberra International Airport (Fairbairn), Hall, Harman, Hume, Oaks Estate, Pialligo, Symonston

The warning area is based on the Canberra/Queanbeyan urban centre (as defined by the Bureau of Statistics), and the suburbs and divisions used by the ACT Planning and Land Authority.

Figure 5. Example graphic of a Detailed Severe Thunderstorm Warning for the Canberra area. Note the boundary of the warning area in this graphic is for representation purposes only. For the exact detail of area coverage the comprehensive list of included suburbs provided above should be used.



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Australian Government

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**NSW & ACT
Fire Season Report**

DRAFT

2013/2014

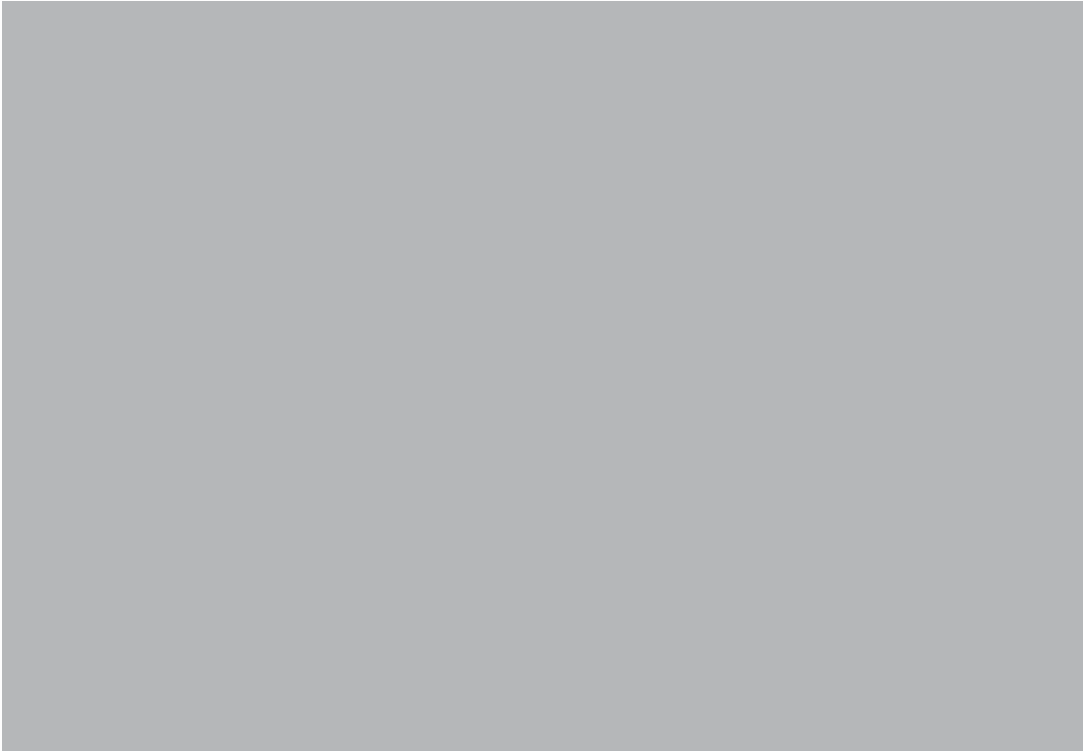
**Bureau of Meteorology
New South Wales Regional Office
Severe Weather Section**

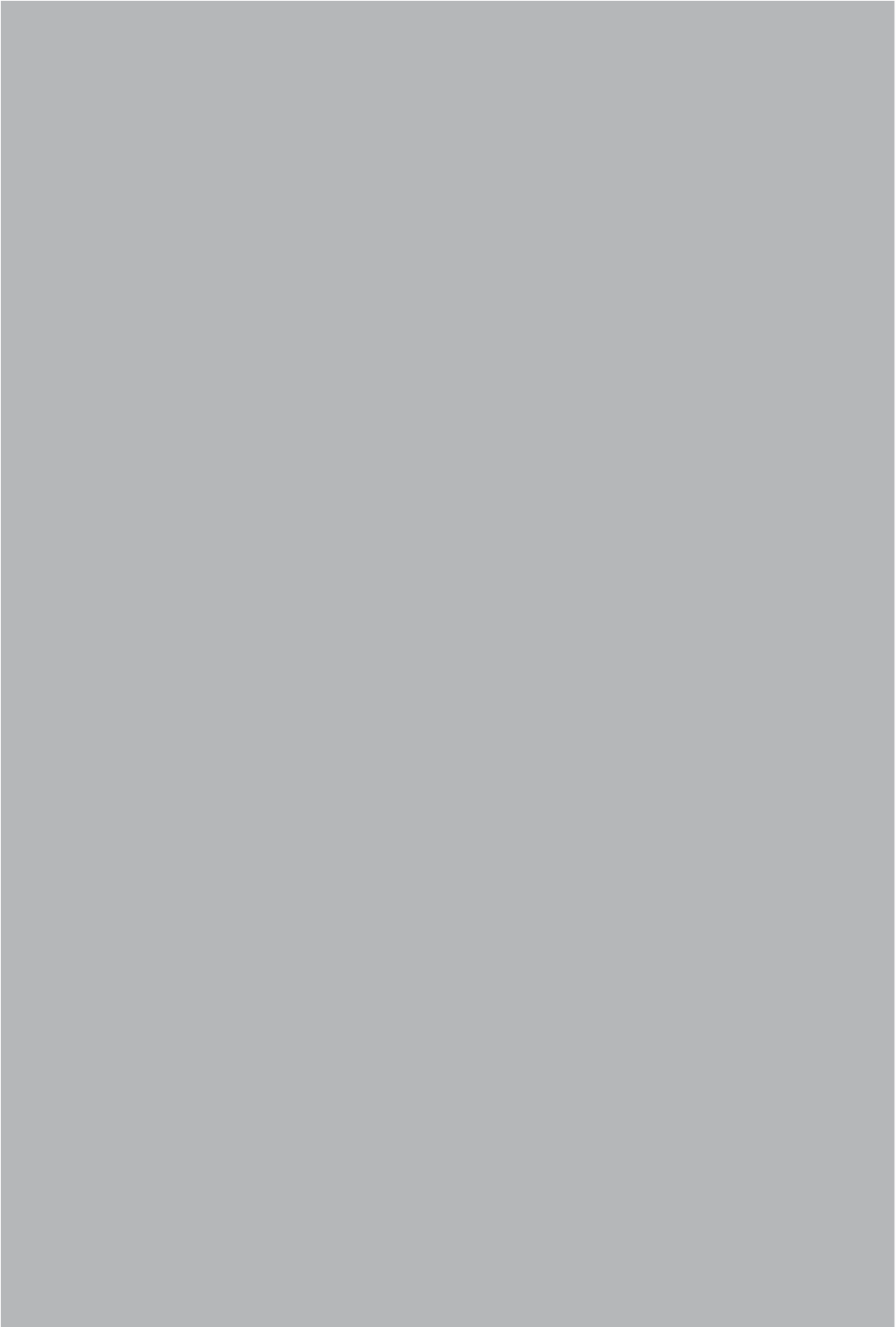
June 2014



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Fire Weather Warning Statistics have not been calculated regarding each different level of warning (Severe, Extreme, and Catastrophic). Statistics focus on weather forecasts or observations reached the Severe category.

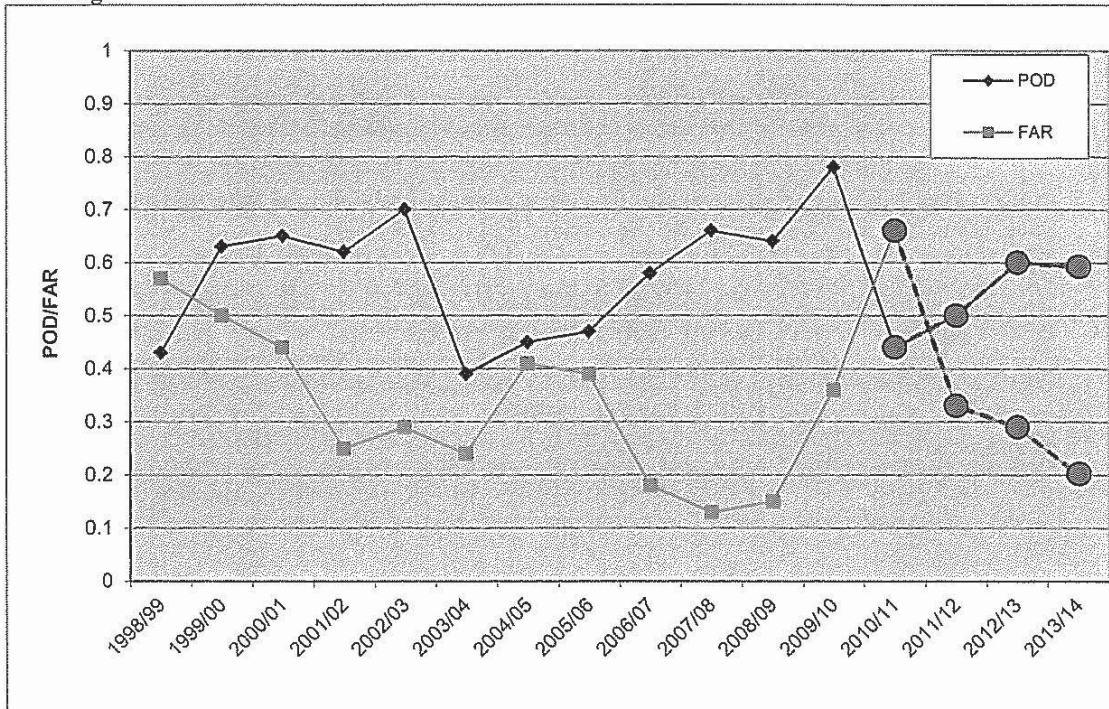
<i>All NSW Fire Areas</i>	<i>2013-2014 Season</i>	<i>2012-2013 Season</i>	<i>2011-2012 Season</i>	<i>2010-2011 Season</i>
Hits	87	64	2	4
Misses	60	43	2	5
False Alarms	22	26	1	6
POD	0.59	0.60	0.50	0.44
FAR	0.20	0.29	0.33	0.66

Table 1: Comparison of Hits, Misses, False Alarms and the corresponding Probability of Detection and False Alarm Rates for the past four seasons

Table 1 highlights the number of events covered by the verification between two La Nina seasons (2010/2011 and 2011/2012), with 13 total instances of observed Severe fire danger, and two neutral ENSO seasons (2012/2013 and 2013/2014), with 254 total instances of observed Severe fire danger.

The change to only using the GFDI scale to assess ratings in western NSW will also reduce the instance of observed Severe fire danger, at least partially contributing to the reduced number of these events from the 2010/2011 season onwards.

Figure 5: Probability of Detection (POD) and False Alarm Ratio (FAR) for Fire Weather Warnings



The introduction of spatial forecasts from the 2010/2011 season

mean that the recent data points marked in red cannot be directly compared to the POD and FAR trends from earlier. Given the small sample set since the 2010/2011 season, it is difficult to gauge any actual trend in POD and FAR statistics. Also, the small number of FWW events during both the 2010/2011 and 2011/2012 seasons further limits the ability to draw any conclusions from the POD and FAR. What is apparent is that over the last four seasons the FAR has maintained a declining trend, with this season registering the lowest false alarm rate since the 2008/2009 season, with an increasing trend apparent in the POD. A larger sample set is still required to better determine actual trends.

Metropolitan Fire Weather Warnings

The Greater Sydney Fire Area recorded Severe or greater fire danger indices on 18 occasions in the 2013-2014 season. (see Table 2). On ten of these occasions warnings were current. Eight events were missed, however with the exception of the 10th of September and 9th of November, these days only saw one or two stations (usually Richmond or Sydney Airport) recording a fire danger index of over 50.

Greater Sydney Fire Area 2013-2014 Season

Hits	10
Misses	8
False Alarms	0
POD	0.56
FAR	0

Table 2: Hits, Misses, False Alarms and the Corresponding Probability of Detection and the False Alarm Rates for this Season for the Greater Sydney Fire Area

<i>Day</i>	<i>Stations recording FDI >50</i>	<i>Warning Issued?</i>
10 th Sep	YSSY, YSRI, YSBK, HOLS	No
24 th Sep	YSRI	Yes
26 th Sep	YSSY, YSRI	Yes
28 th Sep	YSSY	Yes
1 st Oct	YSSY, YSCN, HOLS, PENR	Discretionary Range
6 th Oct	YSRI	Yes
10 th Oct	YSSY, YSRI, YSBC, YSBK, YSCN, CBRC, HOLS, HPEC, PENR, HOM	Yes
12 th Oct	YSRI	No
13 th Oct	YSSY, YSRI, YSBC, YSBK, YSCN, CBRC, HPEC, MGMT, YTRY, PENR, HOM	Yes
16 th Oct	YSRI	No
17 th Oct	YSSY, YSRI, YSBC, YSBK, CTMA, YSCN, CBRC, HPEC, YTRY, PENR, HOM, MTBO	Yes
23 rd Oct	YSSY	Yes
24 th Oct	YSSY (50)	No
2 nd Nov	YSRI, PENR	No
3 rd Nov	YSSY, YSRI, YSBC, YSBK, CTMA, YSCN, CBRC, HPEC, PENR, HOM	Yes
8 th Nov	YSRI (49)	Yes
9 th Nov	YSRI, YSBC, HPEC, PENR	No
10 th Dec	YSRI	No
6 th Jan	YSCN	No

Table 3: Days with Severe or greater fire danger index (FDI) recorded in the Greater Sydney Fire Area

Extreme FDI was recorded in the Greater Sydney Fire Area on three days, the 10th September, 10th October and 3rd November, reaching Catastrophic FDI on two days, the 13th and 17th October (at Sydney Airport only). A Fire Weather Warning was current for all but one of these days, the 10th September.

Catastrophic Fire Danger Ratings¹

Catastrophic fire danger indices were recorded on 7 occasions, on the 13th and 17th of October and the 3rd of January. For the purposes of this verification, misses were not counted if between 0 and 10% of the forecast area was covered by Catastrophic, which accounts for three of the cases. From the remaining four, there were no hits, no false alarms and four misses, giving a probability of detection of 0 and a false alarm rate of 0.

Totals (for <i>Catastrophic</i> categories)		
Total number of Hits (CH)	(X)	0
Total number of Misses (CM)	(Y)	4
Total number of False Alarms (CF)	(Z)	0
Total number of Cat FD observed	(X+Y)	7
Total number of Warnings issued	(X+Z)	0
P.O.D	$X/(X+Y)$	0
F.A.R	$Z/(X+Z)$	0

Table 4: Verification of Catastrophic fire danger rating forecasts

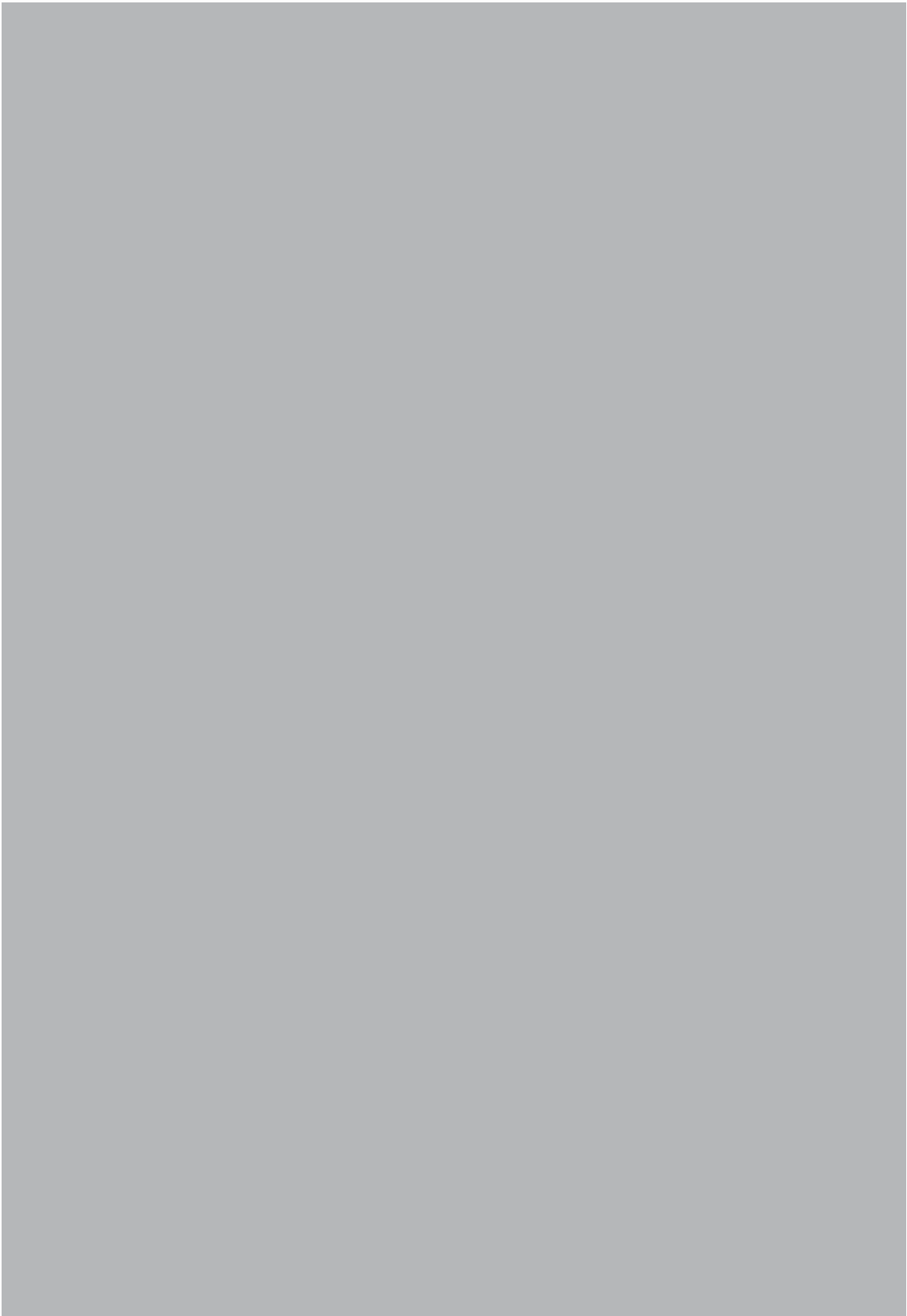
Day	Fire Area	Stations recording FFDI >100 or GFDI >150	Warning Issued?
13 th Oct	Greater Sydney	YSSY	No
13 th Oct	Hunter	MUI	No
17 th Oct	Greater Sydney	YSSY	No
17 th Oct	Monaro/Alpine	THDB	No
3 rd Jan	Northern Slopes	YGDH	No
3 rd Jan	North Western	YNBR, YCBB	No
3 rd Jan	Upper Central West Plains	YCNM	No

¹The algorithms for the Fire Danger Indices become increasingly non-linear for FDI's exceeding 50. This means that small changes in the meteorological ingredients results in large changes in the index. As a consequence, it will be unlikely that the verification statistics for the Catastrophic rating will be as good as those for the Severe rating.



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ACT Fire Season

Severe or greater FDI was recorded in the ACT (at Canberra Airport, Tuggeranong or Mt Ginini) on 4 days, with another 1 day being marginally Severe. No Extreme or Catastrophic FDI values were recorded in the ACT during the season.

<i>ACT</i>	<i>2013/2014 Season</i>
Fire Weather Warnings	6
Hits	4
Misses	0
False Alarms	2
POD	1.0
FAR	0.33

<i>Day</i>	<i>Stations recording FDI > 50</i>	<i>Warning Issued?</i>
22 nd Dec	YSCB	Yes
16 th Jan	YSCB, TUGG	Yes
17 th Jan	YSCB	Yes
9 th Feb	YSCB, TUGG	Yes







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From: [REDACTED]
Sent: Friday, 7 March 2014 15:52
To: [REDACTED]
Cc: [REDACTED]
Subject: Major airport TAF verification. [SEC=UNCLASSIFIED]
Attachments: Industry Major AirportsTAF report Jul to Nov13.pdf

Hi [REDACTED]

I have just started providing the aviation industry with TAF verification reports. These reports examine a number of metrics at each airport and measure them against the 10 year average (2002-2012) for the aerodrome. I've attached a recent paper report for the end of last year that helps explain the metrics. Below I have highlighted good results in green and anomalies in orange. The anomalies do not mean forecasting processes were wrong they just say that some parameters were below the norm. I intend to add a couple of lines on reasons for the anomalies to be included in future reports.

The attached document shows how I calculated the figures using AVS(1).

I would be grateful for some feedback on February in Cairns. I spoke to [REDACTED] today and he indicated that you had a significant number of rain days last month that would have necessitated below minima forecasts. I have attached the figures below. The Operationally Correct figure starts to get low if there is a lot of INTER or TEMPO below minima on the TAF that is not verifying well. There were 57 hours of below minima recorded, which was high compared to previous months.

I am not after a detailed account, just a few of lines to describe your thoughts on the anomaly.

Cairns

Alternate Minimum 6000m 1400ft
 Landing Minimum 4100m 720ft

Month	2014						10 Year Avg
	October	November	December	January	February	March	
FSI (1-4hrs)%	0.37	0.29	0.5	0.18	0.1		
Vis <1000 POD (1-6hrs)%	0	0	0	0	0		0
Vis <1000 FAR (1-6hrs)%	0	0	0	0	0		100
Vis <1000 HRS (1-6hrs)	0	0	0	0	0		0.2
Forecast FG Hours (1-6hrs)	0	0	0	0	0		14
TS POD (1-6hrs)%	0	67.1	0	63.6	100		60.7
TS FAR (1-6hrs)%	0	97	100	84.5	94.9		93.6
TS HRS (1-6hrs)	2	4	0	3.67	4		435.9
Forecast TS Hours (1-6hrs)	0	87	6	15	78		4152
%Operationally correct (1-6hrs only)	92.49	70.04	87.84	71.97	53.66		71.71
% Failed detections (1-6hrs)	0.66	0.18	0.16	0.1	0.26		0.35
% False Alarms (1-6hrs)	6.86	29.78	12	27.93	46.08		27.94

Hours Below (1-6hrs) 8.53 11.1 3.67 27.9 57.1 4002.6

I am happy to discuss this at any time.

Kind regards

[Redacted]

[Redacted]

Australian Bureau of Meteorology

Manager

Major Airport Weather Services

Weather and Ocean Services Branch

PO BOX 211 Mascot NSW 1460

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M [Redacted]

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TAF Verification
for Major Airports
July to November 2013

[Redacted]

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Bureau of Meteorology

Major Airport Services

TAF Verification Report for July to November 2013

This is the third quarterly verification report in 2013 and feedback on its content would be appreciated.

The graphs on each page are calculated as follows:

Forecast Safety Index

This index is designed to represent the actual risk the aircraft has of encountering un-forecast weather, which they are unable to land in (Conditions below the landing minima or thunderstorms observed). This figure is calculated for the first 4 hours of the TAF. The lower the percentage, the less the risk to pilots using the TAF for flight planning that month. Figures near or above 1% require some scrutiny.

Thunderstorms

POD is the probability of detection % of a TS by the TAF in the first 6 hours of the forecast.

FAR is the false alarm ratio% and is the number of TS hourly misses divided by the total forecast TS hours in the first 6 hours of every TAF for the month. A FAR of 80% means 5 hours of forecast TS for every hour of TS reported. 80% is a very good result. A result of 95% means 20 hours of forecast TS for every reported TS within the TAF. High values often occur if there are very low numbers of TS in a month. This figure does not include missed TS by the first 6 hours of the TAF.

TS Hours is the total number of observed TS hours in the month.

Forecast TS Hours is the number of TS hours forecast in the first 6 hours of the TAF over the month.

Fog

These fog statistics are based on a reported visibility of <1000m as extracted from AVS(1). They could be distorted by observations of heavy precipitation and smoke. Heavy precipitation that reduces visibility below 1000m in fog seasons across Australia is extremely unlikely. These metrics should be treated with caution October to March.

POD is the probability of detection % of fog by the TAF in the first 6 hours of the forecast.

FAR is the false alarm ratio% and is the number of Fog hourly misses divided by the total forecast Fog hours. A FAR of 80% means 5 hours of forecast Fog for every hour of hit. 80% is a very good result. A result of 95% means 20 hours of forecast Fog for every hour of hit. This figure does not include outright misses by the TAF.

Fog Hours is the total number of observed Fog hours in the month.

Forecast FG Hours is the number of FG hours forecast in the first 6 hours of the TAF over the month.

Alternate Minima

Operationally Correct is the % of time for the month that the first 6 hours of every TAF were forecast above minima and observed above minima plus forecast below minima and observed below minima.

Failed detections are the % of time below the alternate minimum when the TAF forecast above minimum in the first 6 hours of every TAF.

False Alarms are the % of time that the TAF forecast below the alternate minimum in the first 6 hours when the observed conditions were above.

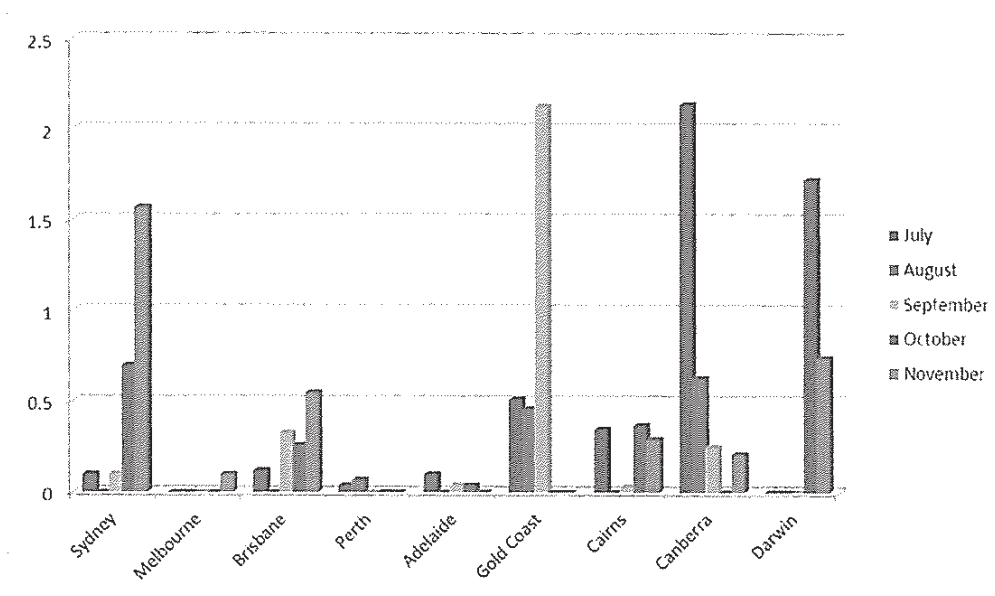
Hours Below are the number of hours observed below the alternate minimum.

Summary of Results

Forecast Safety Index

% of Unsafe forecasts

	July	August	September	October	November
Sydney	0.1	0	0.1	0.7	1.57
Melbourne	0	0	0	0	0.1
Brisbane	0.12	0	0.33	0.26	0.55
Perth	0.04	0.07	0	0	0
Adelaide	0.1	0	0.04	0.04	0
Gold Coast	0.51	0.46	2.13	0	0
Cairns	0.35	0	0.03	0.37	0.29
Canberra	2.14	0.63	0.25	0	0.21
Darwin	0	0	0	1.72	0.74



Forecast Safety Index by Major Airport. The following spikes are shown:

Sydney (November) late forecast TS on two occasions.

Gold Coast (September). Short lived fog events early morning. No present weather sensor.

Canberra (July) 222 hours of observed fog.

Darwin (October) late forecast TS.

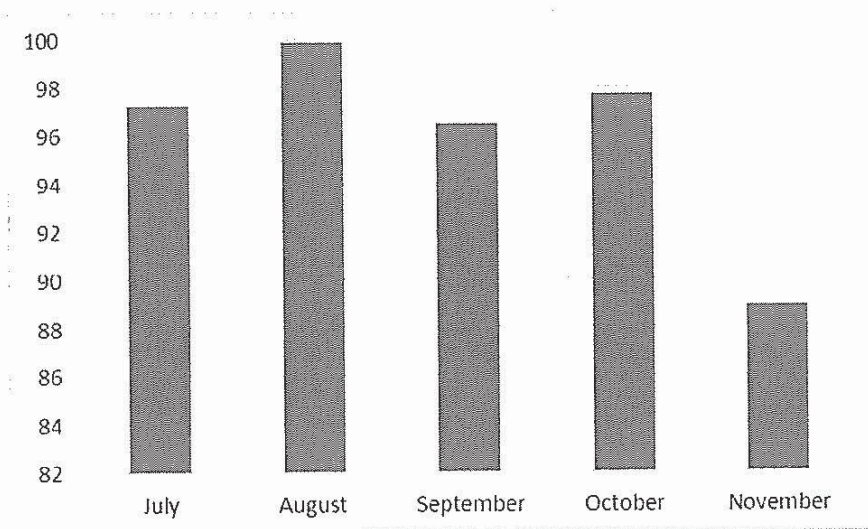
Sydney

Alternate Minimum	2500m	700ft
Landing Minimum	2000m	250ft

Month	July	August	September	October	November
FSI (1-4hrs) %	0.1	0	0.1	0.7	1.57
Vis <1000 POD (1-6hrs)%	0	0	0	0	0
Vis <1000 FAR (1-6hrs)%	100	0	100	0	0
Vis <1000 HRS (1-6hrs)	0	0	0	0	0
Forecast FG Hours (1-6hrs)	11	0	4	0	0
TS POD (1-6hrs)%	34.1	0	100	0	51.1
TS FAR (1-6hrs)%	88.9	0	95	100	82.5
TS HRS (1-6hrs)	2.93	0	1	0.73	19.9
Forecast TS Hours (1-6hrs)	9	0	20	12	77
Operationally correct (1-6hrs only) %	97.23	99.87	96.44	97.68	88.9
Failed detections (1-6hrs) %	0.26	0.13	0.26	0.2	1.98
False Alarms (1-6hrs) %	2.51	0	3.31	2.12	9.12
Hours Below (1-6hrs)	2.93	1	3.43	12	30.1

Thunderstorm forecasts were subject to AMIR investigation and lessons learned will be incorporated into forecaster notes. There was a prolonged TS event on 15 November.

Operationally Correct %

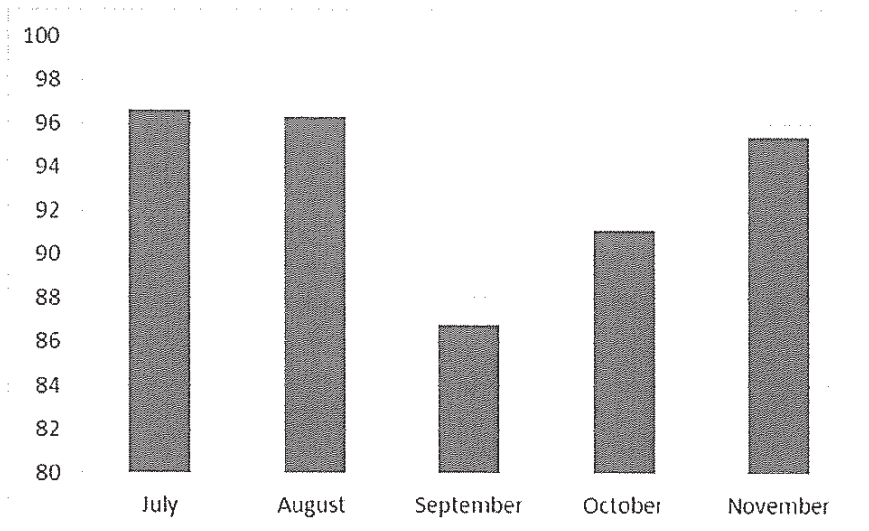


Melbourne

Alternate Minimum 2500m 700ft
Landing Minimum 800m 210ft

Month	July	August	September	October	November
FSI (1-4hrs)%	0	0	0	0	0.1
Vis <1000 POD (1-6hrs) %	0	0	0	0	0
Vis <1000 FAR (1-6hrs) %	0	0	100	0	100
Vis <1000 HRS (1-6hrs)	0	0	0	0	0.52
Forecast FG Hours (1-6hrs)	0	0	18	0	7
TS POD (1-6hrs) %	52	0	54.5	0	100
TS FAR (1-6hrs) %	97.3	100	98.4	100	95
TS HRS (1-6hrs)	1.25	0	1.1	0	0.33
Forecast TS Hours (1-6hrs)	22	28	38	26	6
Operationally correct (1-6hrs only) %	96.62	96.3	86.84	91.13	95.39
Failed detections (1-6hrs) %	0.08	0.02	0.17	0.32	0.12
False Alarms (1-6hrs) %	3.3	3.68	12.99	8.56	4.49
Hours Below (1-6hrs)	1.25	0.15	11.6	3.63	10.7

Operationally Correct%

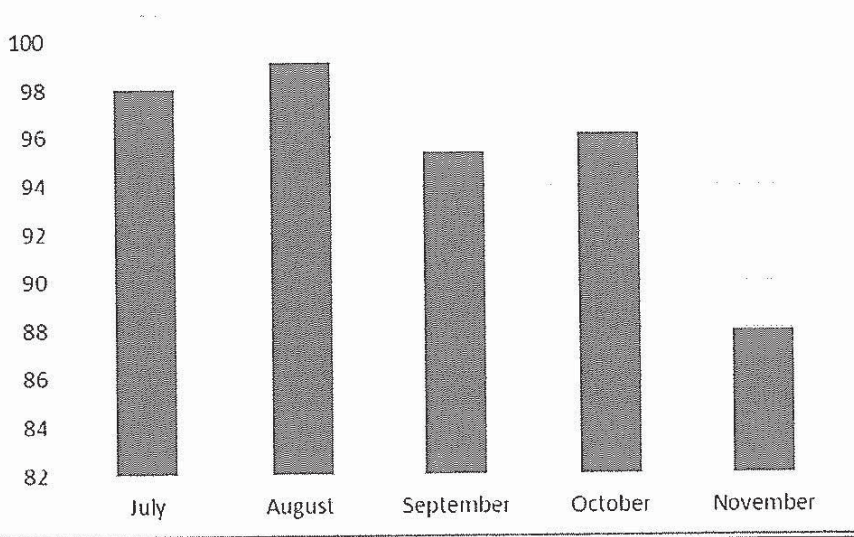


Brisbane

Alternate Minimum 2500m 700ft
 Landing Minimum 800m 220ft

Month	July	August	September	October	November
FSI (1-4hrs)%	0.12	0	0.33	0.26	0.55
Vis <1000 POD (1-6hrs) %	33.3	0	29.5	0	0
Vis <1000 FAR (1-6hrs) %	93.7	100	97.1	0	0
Vis <1000 HRS (1-6hrs)	1.7	0	1.58	0	0
Forecast FG Hours (1-6hrs)	9	5	17	0	0
TS POD (1-6hrs) %	0	0	83.8	56.2	91.2
TS FAR (1-6hrs) %	0	100	86	87.1	77.9
TS HRS (1-6hrs)	0	0	4.22	8	38.8
Forecast TS Hours (1-6hrs)	0	2	25	35	160
Operationally correct (1-6hrs only) %	98.02	99.12	95.38	96.17	87.97
Failed detections (1-6hrs) %	0.19	0	0.22	0.41	0.36
False Alarms (1-6hrs) %	1.79	0.88	4.4	3.42	11.67
Hours Below (1-6hrs)	3.9	0	12.4	8	38.8

Operationally Correct%

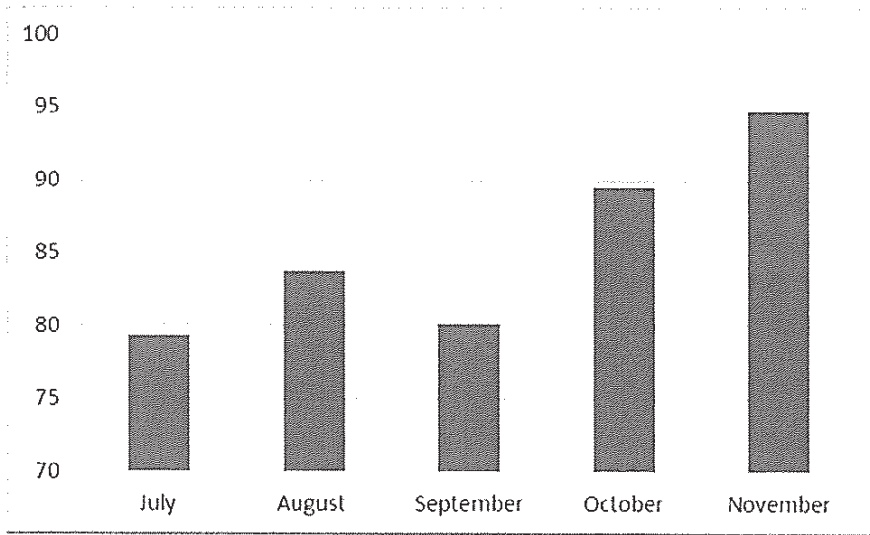


Perth

Alternate Minimum 2500m 700ft
Landing Minimum 1500m 250ft

Month	July	August	September	October	November
FSI (1-4hrs)%	0.04	0.07	0	0	0
Vis <1000 POD (1-6hrs)%	96.5	0	100	100	0
Vis <1000 FAR (1-6hrs)%	95.6	100	87.2	98.8	0
Vis <1000 HRS (1-6hrs)	5.27	0	11.3	0.93	0
Forecast FG Hours (1-6hrs)	117	77	88	73	0
TS POD (1-6hrs)%	100	0	100	0	0
TS FAR (1-6hrs)%	99	100	93.5	100	100
TS HRS (1-6hrs)	0.6	0	7.13	0	0
Forecast TS Hours (1-6hrs)	76	31	109	21	33
Operationally correct (1-6hrs only)%	79.39	83.77	80.17	89.54	94.81
Failed detections (1-6hrs)%	0.85	0.5	0.23	0.3	0
False Alarms (1-6hrs)%	19.77	15.73	19.6	10.16	5.19
Hours Below (1-6hrs)	26.4	7.18	32	7	0

Operationally Correct%

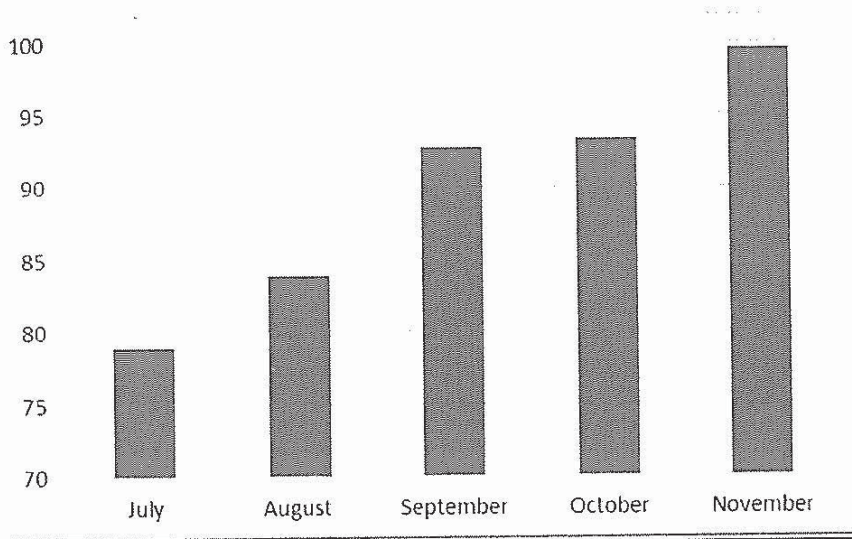


Adelaide

Alternate Minimum 4000m 850ft
Landing Minimum 1200m 270ft

Month	July	August	September	October	November
FSI (1-4hrs)%	0.1	0	0.04	0.04	0
Vis <1000 POD (1-6hrs)%	0	100	0	0	0
Vis <1000 FAR (1-6hrs)%	100	85.7	0	0	0
Vis <1000 HRS (1-6hrs)	0	1	0	0	0
Forecast FG Hours (1-6hrs)	28	7	0	0	0
TS POD (1-6hrs)%	0	0	100	52.4	0
TS FAR (1-6hrs)%	100	100	99.1	98.4	0
TS HRS (1-6hrs)	0.55	0	0.35	1.4	0
Forecast TS Hours (1-6hrs)	36	21	35	45	0
Operationally correct (1-6hrs only)%	78.96	83.92	92.69	93.26	99.54
Failed detections (1-6hrs)%	0.62	0.71	0.17	0.14	0.13
False Alarms (1-6hrs)%	20.43	15.37	7.14	6.6	0.33
Hours Below (1-6hrs)	13.2	16.3	2.6	2.08	1.5

Operationally Correct%



Gold Coast

Alternate Minimum	6000m	1439ft
Landing Minimum	4100m	750ft

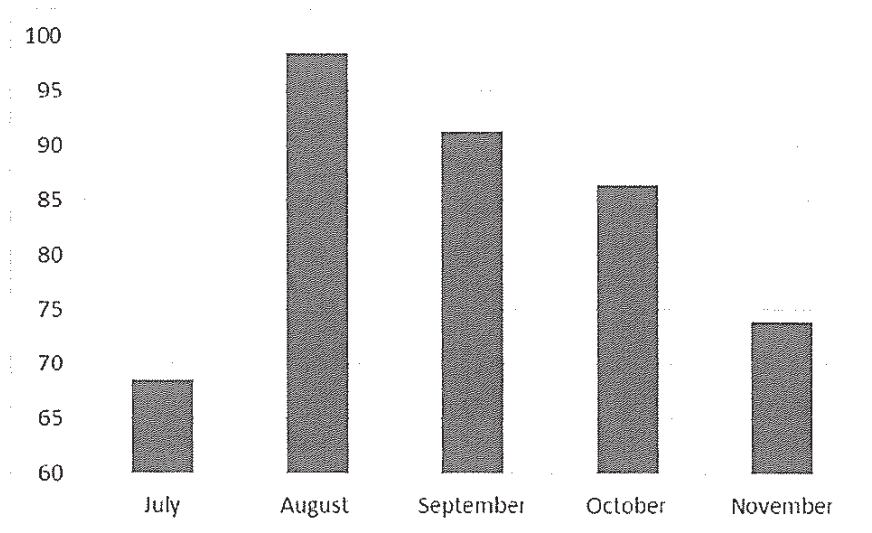
Month	July	August	September	October	November
FSI (1-4hrs)%	0.51	0.46	2.13	0	0
Vis <1000 POD (1-6hrs)%	0	0	9.5	0	0
Vis <1000 FAR (1-6hrs)%	0	0	57.3	0	0
Vis <1000 HRS (1-6hrs)	1.65	0	13.5	0	0
Forecast FG Hours (1-6hrs)	0	0	3	0	0
Operationally correct (1-6hrs only)%	68.54	98.54	91.35	86.47	74.01
Failed detections (1-6hrs)%	1.34	0.82	2.91	0.72	0.26
False Alarms (1-6hrs)%	30.11	0.64	5.73	12.81	25.72
Hours Below (1-6hrs)	46.4	6.42	41.5	13.4	28.4

September <1000m vis events (UTC): 14 Sep 1430 – 1830, 16 Sep 1314 (300m vis in a patch?), 19 Sep 1430-1600, 1800-1830, 1930-2000.

No present weather capability so unsure of weather phenomenon causing visibility problem in September but suspect FG.

Unable to verify thunderstorms so false alarms may be distorted (too high) and operationally correct too low.

Operationally Correct

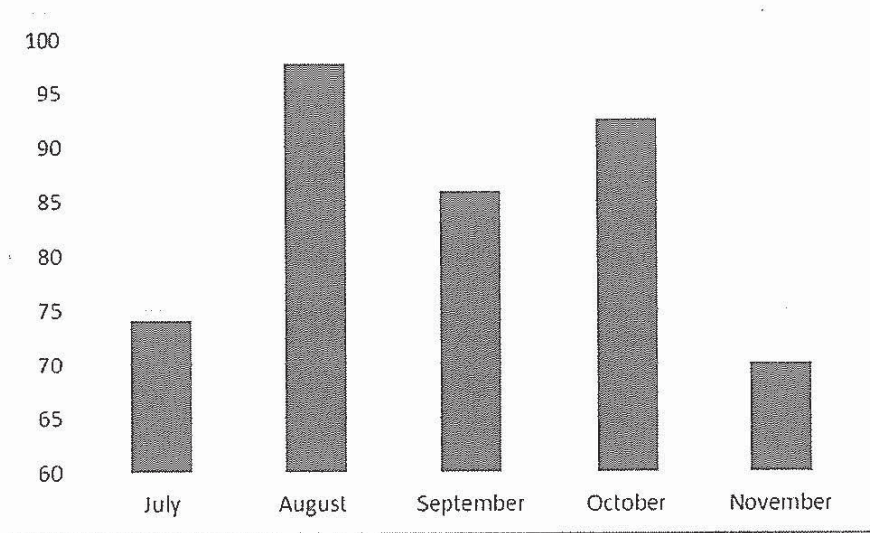


Cairns

Alternate Minimum	6000m	1400ft
Landing Minimum	4100m	720ft

Month	July	August	September	October	November
FSI (1-4hrs)%	0.35	0	0.03	0.37	0.29
Vis <1000 POD (1-6hrs)%	0	0	0	0	0
Vis <1000 FAR (1-6hrs)%	0	0	0	0	0
Vis <1000 HRS (1-6hrs)	0	0	0	0	0
Forecast FG Hours (1-6hrs)	0	0	0	0	0
TSPOD (1-6hrs)%	0	0	0	0	67.1
TS FAR (1-6hrs)%	0	0	0	0	97
TS HRS (1-6hrs)	0	0	0	2	4
Forecast TS Hours (1-6hrs)	0	0	0	0	87
%Operationally correct (1-6hrs only)	74.08	97.75	85.88	92.49	70.04
% Failed detections (1-6hrs)	0.46	0	0.07	0.66	0.18
% False Alarms (1-6hrs)	25.46	2.25	14.05	6.86	29.78
Hours Below (1-6hrs)	12.9	0	3.67	8.53	11.1

Operationally Correct%

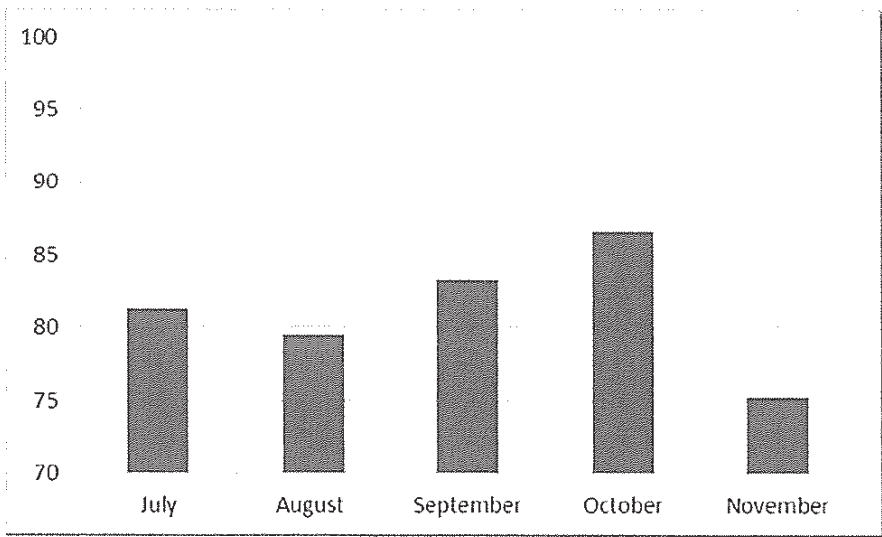


Canberra

Alternate Minimum 6000m 2194ft
Landing Minimum 1700m 570ft

Month	July	August	September	October	November
FSI (1-4hrs)%	2.14	0.63	0.25	0	0.21
Vis <1000 POD (1-6hrs)%	91.3	88	0	100	0
Vis <1000 FAR (1-6hrs)%	62	93.4	100	90	0
Vis <1000 HRS (1-6hrs)	92.5	7.1	4.57	1.57	0.4
Forecast FG Hours (1-6hrs)	222	94	5	16	7
TS POD (1-6hrs)%	0	0	50	0	76.5
TS FAR (1-6hrs)%	0	100	96.2	100	95.9
TS HRS (1-6hrs)	0	0.55	2	0	5.47
Forecast TS Hours (1-6hrs)	0	3	26	61	103
Operationally correct (1-6hrs only)%	81.29	79.49	83.31	86.65	75.3
Failed detections (1-6hrs)%	2.97	1.67	0.51	0.67	0.56
False Alarms (1-6hrs)%	15.74	18.84	16.18	12.67	23.15
Hours Below (1-6hrs)	349.5	79.2	80.1	24.5	29.2

Operationally Correct %



Darwin

Alternate Minimum 4000m 800ft
Landing Minimum 2000m 250ft

Month	July	August	September	October	November	
FSI (1-4hrs)%		0	0	0	1.72	0.74
Vis <1000 POD (1-6hrs)%		0	0	0	0	0
Vis <1000 FAR (1-6hrs)%		100	100	0	0	0
Vis <1000 HRS (1-6hrs)		0	0	0	0	0
Forecast FG Hours (1-6hrs)		11	16	0	0	0
TS POD (1-6hrs)%		0	0	0	52.5	77.5
TS FAR (1-6hrs)%		0	0	0	87.5	93.5
TS HRS (1-6hrs)		0	0	0	32.6	27.6
Forecast TS Hours (1-6hrs)		0	0	0	137	338
Operationally correct (1-6hrs only)%		98.62	97.93	100	86.46	66.8
Failed detections (1-6hrs)%		0	0	0	1.68	0.49
False Alarms (1-6hrs)%		1.38	2.07	0	11.86	32.71
Hours Below (1-6hrs)		0	0	0	33.2	31.9

Operationally Correct %

