



# final report

## FEEDLOTS

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## Online summer heat load forecast service – 2008/2009

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## **Abstract**

A weather forecasting system was developed to assist in warning operators of cattle feedlots of impending adverse weather conditions that could lead to excessive heat loads (and potential mortality) for feedlot cattle. This forecasting system covered several locations in the proximity of feedlots where Bureau of Meteorology (BoM) automatic weather stations (AWS) are located.

The forecasts were made over the period 1 October 2008 to 31 March 2009 at 91 sites throughout Queensland, New South Wales, South Australia, Western Australia, Victoria and Tasmania. Forecasts were made of wind speed, temperature and relative humidity, these being the input parameters necessary to calculate the Heat Load Index (HLI) and ultimately the Accumulated Heat Load Unit (AHLU).

Forecasts for all 91 sites were posted daily onto a website ([www.katestone.com.au/mla](http://www.katestone.com.au/mla)) for easy access to all feedlot operators.

There was good agreement between the forecast and observed temperature and dew point. The relative humidity was calculated from these parameters. Solar radiation was calculated analytically using the date, time of day and latitude of the site. The wind speed forecasting performance, however, was relatively poor.

Heat stress is divided into four risk categories: low, medium, high and extreme. The risk categories span AHLU values of 0 to greater than 100. The low risk category ranges from 0 to 20 AHLU, the higher risk categories extend over 30 and 50 AHLU. It is more important to predict the risk category well than the actual AHLU. The forecasting system's performance at predicting the risk category has been found to be good. It is much more difficult to predict individual AHLU values and, consequently, the forecasting system did not perform as well in this regard.

## Executive summary

### Introduction

One of the issues that needs to be addressed in managing feedlots is the possibility of cattle deaths due to heat stress brought on by adverse weather conditions. One tool for managing heat stress is to forecast stress inducing conditions for a prescribed future period. In the summer of 2001-02, Katestone Environmental developed a forecasting system for MLA to predict a cattle heat stress index out to 6 days ahead for four sites in Queensland and New South Wales. Meteorological data were obtained on a daily basis from the on-site meteorological stations and the nearest Bureau of Meteorology automatic weather station (AWS). The Temperature Humidity Index (THI, an indicator of heat stress) was calculated from these data and made available to feedlot operators.

The forecasting service was expanded over the summer of 2002-03 to incorporate a Heat Load Index (HLI) developed specifically for feedlot cattle and to extend the coverage to 14 sites across eastern Australia. The service was further expanded to a total of 91 sites in 2007.

During the 2008/2009 summer period, forecasts were performed for all 91 sites and made available to feedlot operators on the Katestone web site. A list of sites can be found in Appendix A.

### Key issues

The key issues in implementing a viable feedlot weather forecasting system include:

- (a) Identification of primary and derived meteorological parameters that indicate excessive heat load in cattle.
- (b) Selection of methodology for predicting primary and derived parameters at AWS locations for a suitable time horizon.
- (c) Development of a forecasting software system for predicting feedlot conditions.
- (d) Making the forecasting results available to all feedlot operators on a daily basis.

At the outset, the following constraints were identified:

- Bureau of Meteorology AWS sites are not generally in close proximity to feedlots and this limits the utility of forecasts made from these sites. Most AWS sites are situated near significant populations (typically airports) or industrial regions. All the sites in the forecast program are reliant on the location of a Bureau of Meteorology AWS.
- The Bureau of Meteorology's weather forecast model data (LAPS and GASP), necessary to conduct a forecast, is only stored by the Bureau of Meteorology when requested. Therefore the models created for the recently added sites were based on a smaller amount of historical LAPS/GASP data, which can affect model performance.
- It was found that the most effective technology for making the forecasts available to feedlot operators was through the Internet. The advantages are that the data can be presented in a way which is easily interpreted and is readily accessible by all feedlots.

### Selected methodology

The following methodology was adopted following discussions between MLA and Katestone Environmental on the most viable options:

- Utilise fully the information from the nearest AWS maintained by the BoM

- Calculate the key parameters at a fine time resolution out to 6 days ahead
- Transfer forecasts to a web site on a daily basis

The forecasts were based on the models generated during the previous study conducted by Katestone Environmental for MLA. A description of the models is contained in Appendix B.

### **Forecast performance**

The main factors that affect the HLI (and AHLU) are temperature, relative humidity (obtained from the dew point) and wind speed. There was good agreement between the forecast temperature and relative humidity and the observed quantities, however, the wind speed forecasting performance was relatively poor.

In terms of forecasting the heat stress category, it should be noted that the categories are broad – the low risk category ranges from 0 to 20 AHLUs, the higher risk categories extend over 30 and 50 AHLUs. Therefore, although agreement between the forecast and observed AHLU values might be poor, these would fall into the same heat stress category, giving better performance in predicting the category in contrast to forecasting individual AHLU values.

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## **1 Introduction**

One of the issues facing feedlot managers is the possibility of cattle death in feedlots due to heat stress caused by adverse weather conditions. One tool in the overall management strategy is the ability to forecast stress inducing conditions for a prescribed future period. In the summer of 2001-02, Katestone Environmental undertook a feasibility study for MLA (FLOT.313) for forecasting excessive heat load in cattle. This forecasting system utilised data from four feedlots that operated on-site meteorological stations and was based on the calculation of the Temperature Humidity Index (THI), previously developed as an indicator of human comfort, derived from available forecast meteorological variables (temperature and dewpoint). Forecasts were conducted for on-site meteorological stations and for the nearest Bureau of Meteorology AWS. These forecasts were then compared with observations and it was confirmed that suitable forecasts could be generated from the AWS stations for the feedlot sites.

Recent studies on cattle heat stress (Gaughan et al. 2002) indicate that the HLI was a better indicator of cattle heat stress than the originally used THI. These studies also found that the number of hours that the HLI was above a specified threshold (89) was also a good indicator of accumulated heat load in cattle. The studies also found that if the HLI fell below 77 for a number of hours then the cattle would be able to recover somewhat from the heat stress.

Further studies (see MLA report FLOT.327) have indicated that the Accumulated Heat Load Unit (AHLU), a parameter obtained by accumulating the number of hours the HLI exceeds a certain threshold, is indicative of the heat stress in feedlot cattle. Also, it was found that the threshold depended on genus, environmental factors (wind speed, temperature etc) and pen factors (availability of shade, cooled drinking water etc).

This forecasting system has been expanded each summer since 2001-02 and currently (2008/2009) includes 91 sites around Australia which are listed in Appendix A. Forecasts were conducted every day over the 2008/2009 summer period from 1 October 2008 to 31 March 2009.

## **2 Study definition and objectives**

MLA requested a forecasting system to assist in identifying potential cattle heat stress events. The objectives of the study were to:

- Provide forecasts out to 6 days ahead for predicted daily maximum and minimum HLI, AHLU for various upper HLI thresholds and forecast rainfall. These forecasts were to be made for the period 1 October 2008 to 31 March 2009.
- Allow the forecasts to be accessible on a daily basis by each of the feedlot operators.
- Retrain the models when required to improve the forecasts.
- Examine the accuracy of the forecasts.

## **3 Short – term forecasting of excessive heat load**

### **3.1 Key forecast parameters**

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Short-term forecasting of dry bulb temperature, dewpoint temperature and wind speed are performed on a routine basis by the Bureau of Meteorology (BoM). These are the parameters from which many heat stress indices can be derived. It is also highly desirable to include rainfall and solar radiation parameters in any heat load forecasting scheme but there is currently less skill in producing such forecasts.

Regional rainfall forecasts are available from the Bureau of Meteorology which have been included in the daily forecasts. Solar radiation was calculated analytically using the date, time of day and latitude of the site. The solar radiation value does not account for cloud cover and therefore will overestimate solar radiation for cloudy days. The dependence of the HLI on solar radiation used here is relatively minor and as such the resulting overestimation is not considered significant.

The above variables were used to calculate the HLI and AHLU for each site on a half-hourly basis.

### **3.2 Forecasting methodologies for fine spatial resolution**

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Most available forecast models give a regional forecast for areas up to usually 25 x 25 km. The forecasting system adopted for this project gives a forecast for the location of interest. This can be more beneficial in incorporating local influences on the meteorology such as terrain.

The forecast models for each site for the meteorological variables were produced using the same methodology as previous forecasting detailed in “FLOT. 313 – Development and trial operation of a weather forecasting service for excessive heat load events for the Australian feedlot industry”. In these models, both the wind speed and wind direction are forecast for all sites except Griffith and Hay. For these sites it was necessary to model wind speed alone (as a scalar quantity) due to the large spatial separation between the feedlot and the upper-level input forecast region.

### **3.3 Bureau of Meteorology services**

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LAPS and GASP data were provided by the Bureau of Meteorology for each of the forecasting sites along with the AWS data on a daily basis. Details of this information can be found in the previous forecasting report (Katestone Scientific, 2002). The LAPS and GASP, along with the AWS data, were downloaded, on a daily basis from a web site specially arranged by the Bureau of Meteorology.

### **3.4 Parameters for characterising Heat Stress**

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Three parameters for characterising heat stress in feedlot cattle are the HLI, the AHLU and the panting score. The HLI and AHLU are indirect measures of heat stress, being derived from the prevailing meteorological conditions. The panting score is a direct measure, being derived from the breathing rate of cattle.

### **3.5 Heat Load Index (HLI)**

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The HLI is obtained from the half-hourly average meteorological parameters. These include wind speed, relative humidity and, through an intermediate parameter – the Black Globe Temperature (BGT) - temperature and solar radiation.

The HLI can be thought of as a rate of heat input into a system. Consequently, even though a high HLI value may potentially be highly detrimental, it will have little effect if it is of short duration. A more sensible measure of heat stress is obtained by integrating the HLI to obtain the AHLU, which will be discussed in the following section.

If any calculation yielded a HLI value less than 50, this value was set to 50.

### **3.6 Accumulated Heat Load Unit (AHLU)**

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The AHLU is obtained by integrating or, in the case of discrete data, accumulating the product of HLI and time interval (in hours) between HLI estimates. The AHLU can be thought of as the level of heat stress existing in a system. A high HLI for a short time interval will have the same impact



as a low HLI over a long time interval. Conversely, a high HLI for long periods of time will result in high (and detrimental) values of AHLU.

The Thermo-Neutral zone is defined as a range of HLI values wherein no heat stress is accumulated by cattle. The lower boundary of the Thermo-Neutral zone is set at a HLI value of 77 – recovery occurs when the HLI falls below this value. The upper boundary (upper HLI threshold) of the Thermo-Neutral zone depends on the genus, physical condition and the pen environment of the cattle in question.

Different genotypes react differently to HLI. For example, healthy Bos Taurus would exhibit the symptoms of heat stress at an earlier stage than a healthy Bos Indicus exposed to identical conditions. In other words, Bos Taurus will reach a given AHLU level more quickly than Bos Indicus. To incorporate this into the AHLU calculation and still maintain a consistent correspondence between AHLU and cattle heat stress, an upper HLI threshold below which the AHLU does not accumulate is obtained in terms of genotype, pen conditions and animal state. For discussion and details of how this upper threshold is calculated, the reader is referred to “FLOT. 327 – Development of a Heat Load Risk Assessment Process for the Australian feedlot industry”.

Thus there are two HLI thresholds that must be considered when calculating the AHLU. An upper threshold determined from the report cited above and a lower threshold set at 77. If the HLI value exceeds the upper threshold, the AHLU is incremented by the product of the interval between HLI values and the difference between the HLI and the upper threshold. If the HLI value is less than the lower threshold, the AHLU is decremented by one half of the product of the interval and the difference between the lower HLI threshold and the actual HLI value. The factor of one half is included to allow for the slower recovery rates.

For example, suppose that the current AHLU value is 42 and the upper HLI threshold for a particular cattle type is 90. If the observed HLI were 94, then the excess would be +2  $((94-90)*0.5$ ; the 0.5 representing the half hour interval between observations) and this excess would be added to the current AHLU value giving a new AHLU value of 44. If, instead, the observed HLI value were 65, the nominal excess would be -6  $((65-77)*0.5$ ; 77 being the lower threshold, 0.5 representing the half hour interval between observations). Since the excess is negative, it is halved as the recovery rate is slower, thus final excess is now -3, giving a new AHLU value of 39. For HLI values between 77 and 90, the Thermo-Neutral zone, the excess would be zero.

Evidently, the upper HLI threshold can take a large number of values depending on the characteristics of the animal and its environment, resulting in a corresponding large number of AHLU values. To avoid the situation where excessive amounts of data are generated and analysed, it was decided to determine AHLU values for discrete upper HLI threshold values of 80, 83, 86, 89, 92 and 95.

### **3.7 Panting Score**

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A direct measure of heat stress is the panting score. This is obtained by measuring the breathing rates of cattle in the feedlot. The relationship between AHLU and panting score is summarised in the following table:

AHLU	Heat stress category	Cattle indications
0-20	Low risk	No stress or panting score 1
20-50	Medium risk	Panting score 1-2
50-100	High risk	Panting score 2-4
Over 100	Extreme risk	Panting score 4

### 3.8 Relative Humidity Calculation

The relative humidity (RelHum in %) used in the calculation of HLI was calculated from the temperature (Temp in °C) and dew point temperature (DewPt in °C) using the following equation:

$$RelHum = 100 * \left( \frac{1.8 * DewPt - 0.18 * Temp + 201.8}{1.62 * Temp + 201.8} \right)^8$$

#### Equation 1 - Relative humidity calculated from temperature and dew point

#### 3.8.1 Solar Radiation Calculation

Solar radiation (SolRad in W/m<sup>2</sup>) is not recorded at any of the Bureau of Meteorology AWS sites. The following equations were used to calculate solar radiation for each hour for each day based on the location of the sun throughout the day and year (Oke, 1987). The equation assumes no reduction in radiation due to cloud cover resulting in a conservative estimate of the HLI.

$$localHr = \frac{15\pi}{180}(12 - t)$$

$$declination = \frac{-23.5\pi}{180} \cos\left(\frac{2\pi(day + 10)}{365}\right)$$

$$elevation = \sin^{-1}(\sin(lat)\sin(declination) + \cos(lat)\cos(declination)\cos(localHr))$$

$$SolRad = 1050 \sin(elevation) - 65$$

#### Equation 2 - Solar radiation equation

where

*t* is the time of the day in hours  
*day* is the Julian day of the year  
*lat* is the latitude of the site.

### 3.9 Heat Load Index Calculation

To calculate the HLI for each data record, the following equations were used:

$$BGT = 1.33 * Temp - 2.65 * \sqrt{Temp} + 3.21 * \log(SolRad + 1) + 3.5$$

if  $BGT < 25$

$$HLI = 1.3 * BGT + 0.28 * RelHum - WSpeed + 10.66$$

else

$$HLI = 1.55 * BGT + 0.38 * RelHum - 0.5 * WSpeed + \exp(2.4 - WSpeed) + 8.62$$

#### Equation 3 - Heat Load Index equations

where

Wspeed (Wind speed) is measured in m/s.  
Temp (Temperature) is measured in °C.  
RelHum (Relative humidity) is expressed as a %.  
SolRad (Solar radiation) is measured in W/m<sup>2</sup>  
BGT (Black Globe Temperature) stated in °C.

### 3.10 Accumulated Heat Load Unit Calculation

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The AHLU was calculated using the following algorithm:

```
if HLI < 77
  excess = HLI - 77
else if HLI > upper_threshold
  excess = HLI - upper_threshold
else
  excess = 0

if excess < 0
  excess = excess / 2 // halve it for slower recovery rate

excess = excess * time_interval
AHLUnew = AHLUold + excess
```

#### Equation 4 - Algorithm for accumulating AHLU

where

HLI is the Heat Load Index.  
AHLU is the Accumulated Heat Load Unit.  
upper\_threshold is the HLI value where AHLU starts to accumulate  
time\_interval is the interval between HLI estimates (0.5 hours)

### 3.11 Service delivery mechanisms

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For this project, forecasts were automatically generated every morning (07:30 hrs), checked by Katestone Environmental staff and transferred to the web site [www.katestone.com.au/mla](http://www.katestone.com.au/mla).

### 3.12 Overall methodology

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The prototype system was based on the models developed in our previous forecasting system developed for the MLA. It consists of the following steps:

- a) Obtain upper-level forecast data from numerical weather prediction models via a special web site maintained by the Bureau of Meteorology.
- b) Collect concurrent information from an automatic weather station close to the site of interest.
- c) Once a sufficient training set of information is collected, use proprietary Katestone software to develop statistical models that relate the surface measurement to a subset of the upper-level variables.

d) Use these models and the most recent data to provide the necessary forecasts.

## 4 Accuracy of forecasting system

### 4.1 Statistical measures for forecast accuracy

Three coefficients were used to determine the performance of the HLI forecasting system: the Pearson Correlation Coefficient, Index Of Agreement (IOA) and the Root Mean Square Error (RMSE).

The Pearson Correlation Coefficient is a measure of the strength of the linear relationship between the predicted and observed measurements (defined in Equation 5). The closer this value is to unity the stronger the relationship. The Index Of Agreement (IOA) is defined in Equation 7 and gives an index from 0-1 (1 representing strong agreement). The Root Mean Square Error (RMSE) defined in Equation 6 is an indication of the absolute error. The smaller the RMSE (i.e. the closer the value is to zero) the better the forecast. Note that the RMSE does not indicate whether the forecasts are predominantly higher or lower than the observed values – ie whether the method over or under predicts – it only reports on the difference between the observed and predicted values.

The equations for calculating the coefficients are:

$$r = \frac{N \left( \sum_{i=1}^N O_i P_i \right) - \left( \sum_{i=1}^N O_i \right) \left( \sum_{i=1}^N P_i \right)}{\sqrt{\left[ N \left( \sum_{i=1}^N O_i^2 \right) - \left( \sum_{i=1}^N O_i \right)^2 \right] \left[ N \left( \sum_{i=1}^N P_i^2 \right) - \left( \sum_{i=1}^N P_i \right)^2 \right]}}$$

Equation 5 - Pearson Correlation Coefficient

$$RMSE = \sqrt{\frac{1}{N} \sum_{i=1}^N (P_i - O_i)^2}$$

Equation 6 - Root Mean Square Error

$$IOA = 1 - \frac{(\sum_{i=1}^N P_i - O_i)^2}{\sum_{i=1}^N (|P_i - O_{mean}| + |O_i - O_{mean}|)^2}$$

Equation 7 - Index of Agreement

### 4.2 Forecasting results

The reliability of the AHLU forecasts hinges on the accuracy of the HLI forecasts which ultimately rely on the accuracy of the BoM forecasts. Since any AHLU value also relies on the past behaviour of the HLI (through the accumulation process) any inaccuracies in past HLI predictions will have an impact on the most recent AHLU value. However, in the case of low AHLU values, any extreme behaviour is curtailed by not permitting its value to become negative.

One further issue that the reader should be aware of is that there is a discontinuity imposed on the data in the form of the various cut-off values or thresholds, viz. the Thermo-Neutral zone boundaries. The HLI is also limited to a value of 50 should calculations yield a value lower than

50. AHLU values are not permitted to take on negative values. Consequently, any statistical analyses should not be applied indiscriminately and any results arising from such analyses should be interpreted with this in mind.

By way of example, assume that the observed HLI and the one day ahead forecast HLI are being compared. There will be instances when both of these values will be 50, even though calculations would indicate otherwise. This situation indicates perfect correlation between observed and predicted values. There will also be instances when only one of these parameters will be 50. This will result in a number of (say) observed HLI values paired with predicted values which are set to 50 resulting in statistics which may not be representative of the true situation. The situation is further complicated since two separate equations are used to calculate the HLI value, depending on whether the Black Globe Temperature (BGT) is less than or greater than or equal to 25.

Finally, the quantity of data available for analysis is rather large. There are 91 sites and for each of these sites there are 3 pairs of HLI data sets that can be considered: the observed HLI with each of the one, three and six day ahead forecasts. Also, for each of these sites there are 3 pairs of AHLU data sets and each of these is further subdivided into 6 HLI threshold categories, resulting in excess of 3500 pairs of data sets for each of these parameters.

In order to keep this report to a reasonable length, discussion will be restricted to the general behaviour of the relevant parameters. Detailed summaries are presented in appendices.

#### 4.2.1 HLI Behaviour

The HLI was calculated according to Equation 3 using half-hourly predictions of wind speed, temperature and relative humidity. If the calculated HLI value fell below 50, it was set to 50. Cloud information and solar radiation were not available, hence solar radiation was calculated using Equation 2. This represents the maximum radiation for the time of year, time of day and latitude of the site. Whilst this will tend to overestimate the actual solar radiation, it has only a minor effect on the predicted HLI because of the logarithmic dependence of HLI on solar radiation. To illustrate this, a factor of 10 change in solar radiation (say from 1000 W/m<sup>2</sup> to 100 W/m<sup>2</sup> or cloudless to very cloudy) will cause a decrease in HLI value of either 4.16 to 4.96, depending whether the BGT was below or above 25 respectively.

The performance of the forecasting model was characterised using (a) a line of best fit, (Slope and Intercept) (b) the Pearson Correlation Coefficient, (c) the Root Mean Square Error (RMSE), (d) the Index of Agreement (IOA) and (e) the Bias. The Bias is obtained by summing the difference between the predicted and observed quantities and dividing by the number of samples. Although it is not, strictly speaking, a statistical measure, it does give an indication whether the model is under predicting (negative bias) or over predicting (positive bias).

Table 1 presents the above parameters for the one, three and six day ahead forecasts. The parameters include the three statistical measures, the bias and the slope and intercept of the line of best fit of the forecast vs. observed quantities. For reasons discussed above, data points where either of the observed or forecast HLI was equal to 50 were omitted.

Features worth noting are:

- The overall performance is good. Correlation coefficients range from about 90% for the one day ahead forecasts to about 70%-80% for the six day ahead forecasts.
- All statistics show similar behaviour – forecasting performance slightly decreases as the forecast horizon increases.

- The Bias indicates that the model, in general, correctly predicts the HLI for all forecast horizons.

**Table 1 - Summary of HLI forecast performance for 91 sites**

Forecast horizon		Slope	Intercept	Pearson	RMSE	IOA	Bias
One day ahead	Minimum	0.69	1.12	0.75	4.01	0.85	-3.85
	Average	0.89	6.96	0.87	5.20	0.93	-0.47
	Maximum	0.98	16.70	0.93	8.46	0.96	1.18
Three day ahead	Minimum	0.71	3.05	0.71	4.94	0.84	-4.08
	Average	0.85	10.23	0.83	5.92	0.91	0.37
	Maximum	0.95	20.60	0.92	9.19	0.96	2.85
Six day ahead	Minimum	0.46	6.48	0.44	5.97	0.68	-4.20
	Average	0.75	16.59	0.74	7.04	0.86	-0.16
	Maximum	0.90	30.90	0.90	10.10	0.95	1.98

The Figure 1 is a scatter plot of the one day ahead forecasts of HLI plotted against observed HLI (half-hourly data) for Warwick – one of the cooler Queensland sites. There are several features in this graph which merit some comment.

Firstly, there is a sharp cutoff in the data due to the lower limit of 50. Secondly, the remaining data are scattered about a straight line of unit slope. Perfect forecasts would have resulted in all the points lying exactly on the line. The scatter about the line results from errors in forecasting and increases as the errors in the forecasts increase. This is typical of plots depicting observed versus forecast variables. Note also that the data form two distinct groups or clusters – one centred about a HLI value of about 55 and the other centred on a HLI value of about 88, representing night time and daytime observations/forecasts respectively. Thirdly, there are some data points – the outliers - which are located a substantial distance from the line. Possible explanations for the existence of these are that the forecast technique failed due to exceptional processing conditions (eg an algorithm failed to converge), missing or erroneous input data. It was previously shown (Katestone Environmental 2006) that these points are mainly the result of using two different expressions for calculating the HLI, ie whether the BGT is above or below 25.

Note that the features discussed above are still present the three and six day ahead forecasts shown in Figures 2 and 3 respectively. Also the correlation deteriorates noticeably for these forecasts. This is to be expected as it is more difficult to forecast accurately weather six days ahead than one day ahead.

Figures 4 and 5 are scatter plots of the one day ahead forecasts of HLI plotted against observed HLI for Rockhampton and Ayr, two of the warmer Queensland sites. Noteworthy features include the maximum HLI values which occur between 100 and 110 for Rockhampton and Ayr compared to 90 and 100 for Warwick; and, particularly in the case of Ayr, the more prominent clusters of data due to the use of two different expressions for calculating the HLI.

Results for each site can be found in Appendix C.

From inspection of the performance statistics for the HLI (Appendix C) the sites which performed very well (correlation >0.9 and IOA > 0.95) are:

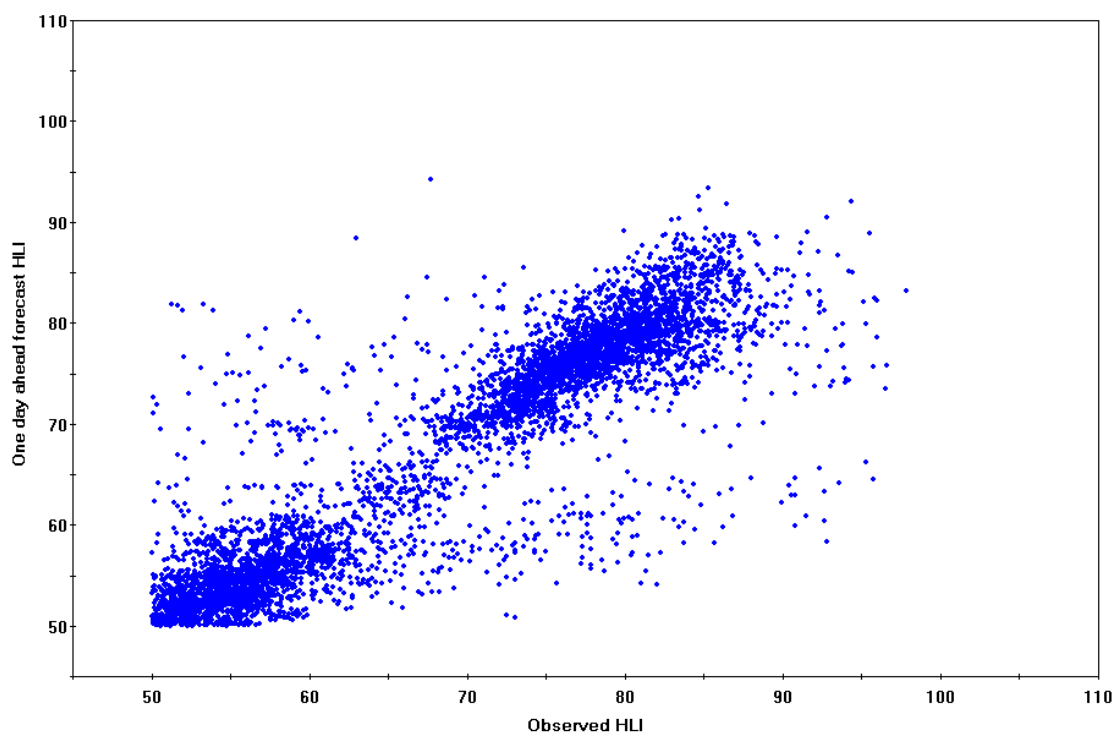
- Applethorpe
- Casino
- Kingaroy
- Mareeba

- Coonamble
- Dalby
- Gayndah
- Grafton
- Gunnedah
- Gympie
- Rockhampton
- Scone
- St Lawrence
- UQ Gatton
- Warwick
- Woolshed

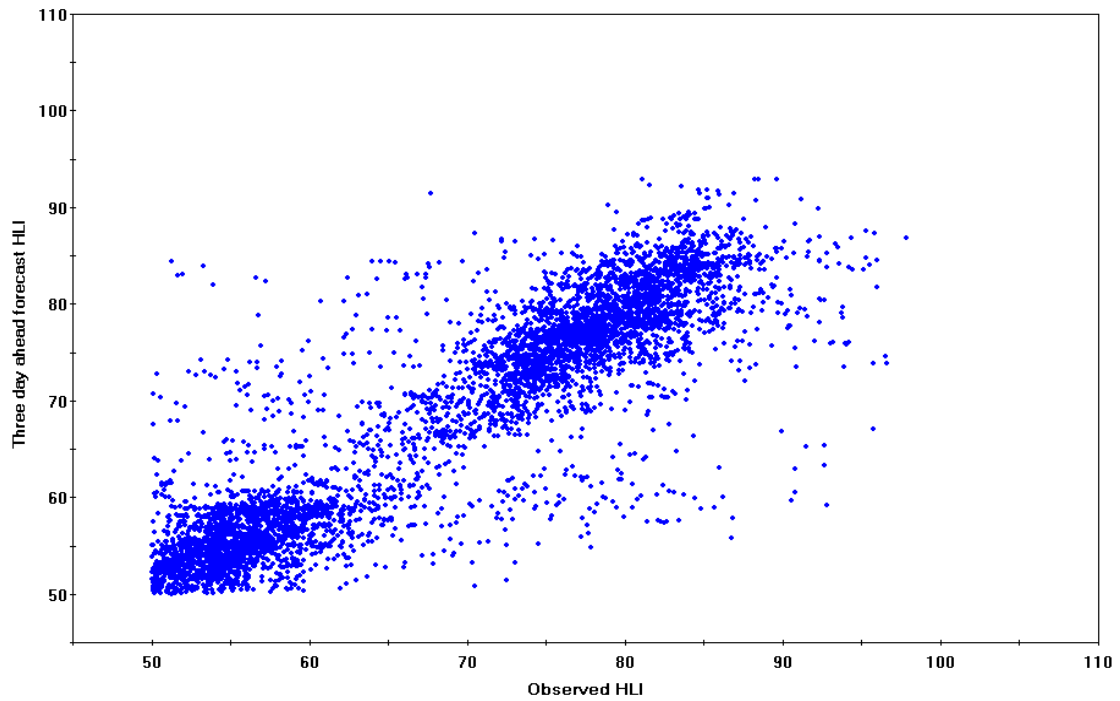
The worst performing sites (correlation < 0.8 and IOA < 0.9) for the HLI are:

- Armidale
- Clare High School
- Katanning
- Warra

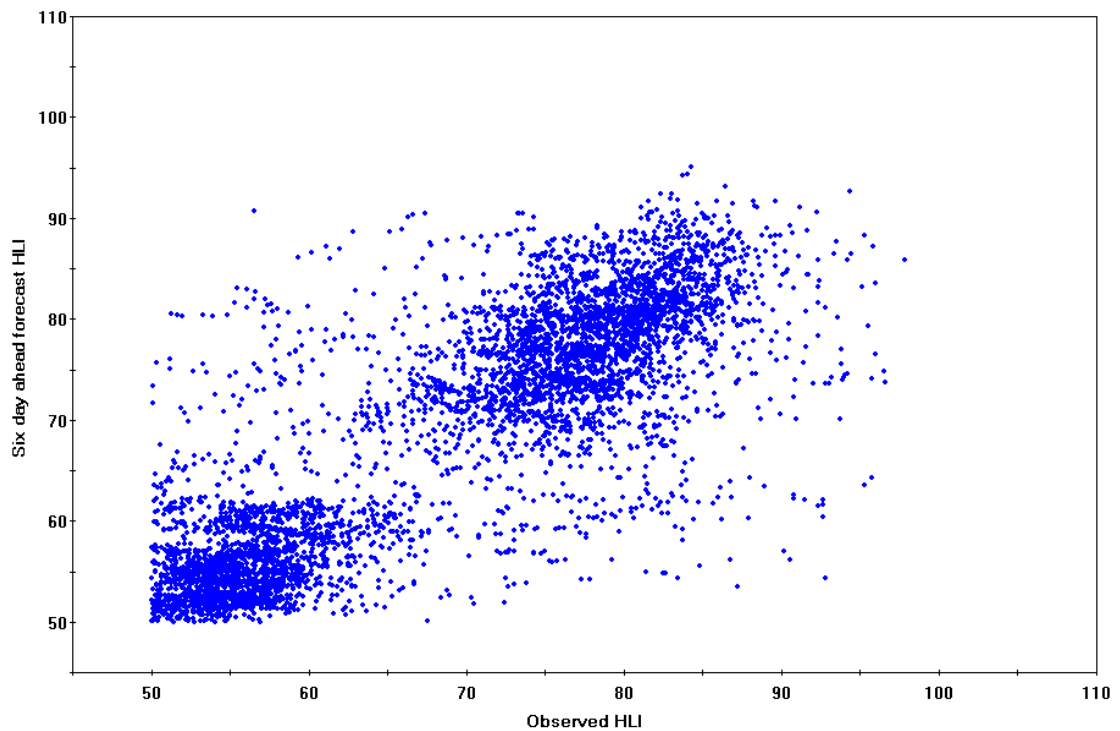
The RMSE was generally at all sites (<5). The highest RMSE's were forecast for St George and Ayr DPI.



**Figure 1 - One day ahead forecast versus observed HLI for Warwick**



**Figure 2 - Three day ahead forecast versus observed HLI for Warwick**



**Figure 3 - Six day ahead forecast versus observed HLI for Warwick**



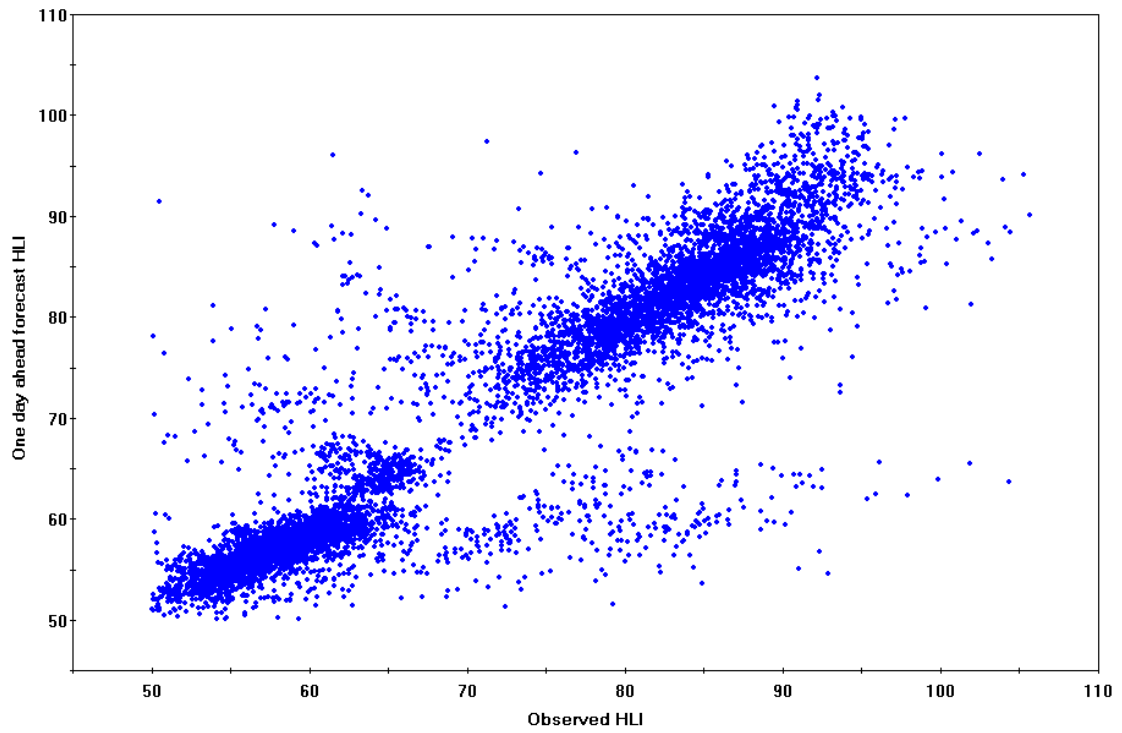


Figure 4 - One day ahead forecast versus observed HLI for Rockhampton

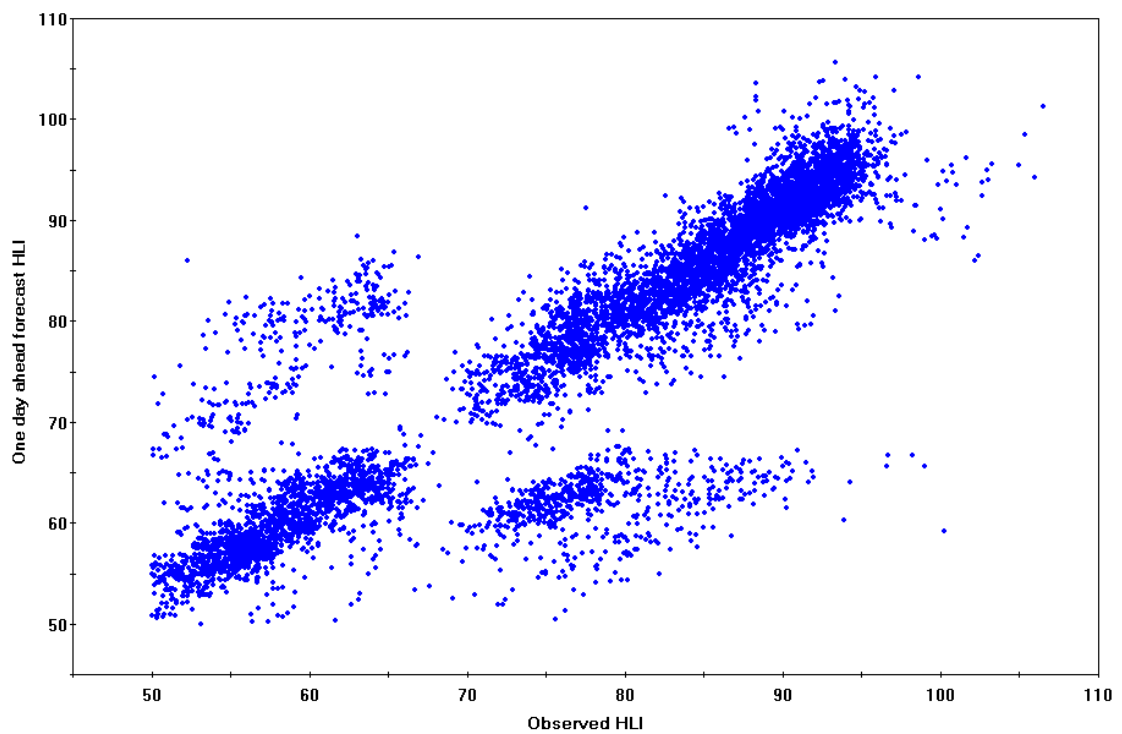


Figure 5 - One day ahead forecast versus observed HLI for Ayr

#### 4.2.2 AHLU Behaviour

Table 2 contains a summary of average forecast performance of the daily maximum AHLU for all sites for the four upper HLI thresholds and three forecast periods. The first row which is labelled “Error” represents the error in the forecasts in terms of risk categories. An error of zero indicates that the correct risk category was forecast. An error of +1 represents a forecast risk category that was one category higher than the observed category (eg forecast a medium and observed a low; forecast extreme and observed a high). Similarly an error of -2 represents a forecast risk category that was two categories lower than the observed category (eg forecast a low and observed a high; forecast medium and observed an extreme). All entries in the table are percentages.

Inspection of Table 2 reveals that the correct risk category (error = 0) was forecast 90% of the time or better. There is a tendency to under-predict the daily maximum AHLU by about 5% for the lower HLI thresholds, decreasing to about 0.1% for the higher HLI thresholds. Also, the performance tends to improve as the upper HLI threshold is increased, with correct category predicted in excess of 99.9% of the time for an upper HLI threshold of 95. This can be explained as follows. The higher thresholds represent cattle that are less susceptible to heat stress. For this situation, both the forecast and observed AHLU values tend to be increasingly in the low risk category with negligible instances of AHLU values occurring in the medium or higher categories.

There are no obvious dependencies between error and forecast horizons and attempts to infer any dependencies should be tempered by the fact that the equations used to calculate the AHLU values are discontinuous and will introduce anomalous behaviour.

Results for each site can be found in Appendix D.

From inspection of the results presented in Appendix D the following comments can be made:

- For an AHLU of 89 (one day ahead forecast) the risk category was correctly forecast (<99% of the time or all but two days) at 47 of the 91 sites and <95% of the time at all but 11 sites.
- The worst performing sites (<90%) for an AHLU of 89 were Ayr DPI, Gympie, Mareeba, Rockhampton, St George, St Lawrence and Woolshed.
- For an AHLU of 92 (one day ahead forecasts) the risk category was correctly forecast (>99% of the time) at 76 of the 91 sites and >95% of the time at all but 5 sites.
- The worst performing sites (<90%) for an AHLU of 92 were Mareeba, St Lawrence, St George and Ayr DPI. At Ayr the forecast category tended to be higher than the observed risk category, while the other three sites tended to observe lower risk than forecast.

**Table 2 - Table of risk category forecast error (daily maximum AHLU values) averaged over all sites for all HLI thresholds**

Horizon	Error						
	-3	-2	-1	0	1	2	3
Upper HLI threshold = 86							
One day	0.10	1.39	3.68	94.55	0.29	0.00	0.00
Three day	0.19	1.63	3.87	93.93	0.33	0.05	0.00
Six day	0.19	1.63	3.59	93.54	0.72	0.29	0.05
Upper HLI threshold = 89							
One day	0.00	0.14	1.96	97.80	0.10	0.00	0.00
Three day	0.00	0.14	2.06	97.66	0.14	0.00	0.00
Six day	0.00	0.14	1.91	97.46	0.43	0.05	0.00
Upper HLI threshold = 92							
One day	0.00	0.00	0.33	99.67	0.00	0.00	0.00
Three day	0.00	0.00	0.33	99.67	0.00	0.00	0.00
Six day	0.00	0.00	0.33	99.62	0.05	0.00	0.00
Upper HLI threshold = 95							
One day	0.00	0.00	0.05	99.95	0.00	0.00	0.00
Three day	0.00	0.00	0.05	99.95	0.00	0.00	0.00
Six day	0.00	0.00	0.05	99.95	0.00	0.00	0.00

### 4.3 Forecasting performance for Meteorological variables

The meteorological parameters used in this project are derived from BoM forecasts and BoM observations at weather stations. These data are used to train propriety models to produce site specific forecasts. Clearly the accuracy of any forecast is dependent on the accuracy of the input data – in this case, BoM forecasts.

Tables 3, 4 and 5 summarise the forecast performance for temperature, relative humidity and wind speed. The statistics presented in these tables are the same as those used in evaluating the HLI forecast performance. An indication of the forecast performance can also be gleaned from Figures 6 and 7 which show the time series of observed and one day ahead forecasts temperature and relative humidity.

**Table 3 - Summary of temperature forecast performance for 91 sites**

Forecast horizon		Slope	Intercept	Pearson	RMSE	IOA	Bias	Count
One day ahead	Minimum	0.55	-1.13	0.70	1.52	0.83	-1.19	7374
	Average	0.90	1.70	0.92	2.43	0.96	-0.31	8407
	Maximum	1.01	10.03	0.96	4.56	0.98	0.46	8480
Three day ahead	Minimum	0.57	-0.08	0.67	1.72	0.81	-1.20	7202
	Average	0.88	2.81	0.89	2.84	0.94	0.36	8170
	Maximum	1.02	10.05	0.94	5.14	0.97	2.43	8240
Six day ahead	Minimum	0.55	0.66	0.62	1.88	0.78	-1.36	6769
	Average	0.83	3.69	0.83	3.61	0.91	0.17	7802
	Maximum	0.97	10.76	0.90	5.69	0.95	2.75	8105

**Table 4 - Summary of relative humidity forecast performance for 91 sites**

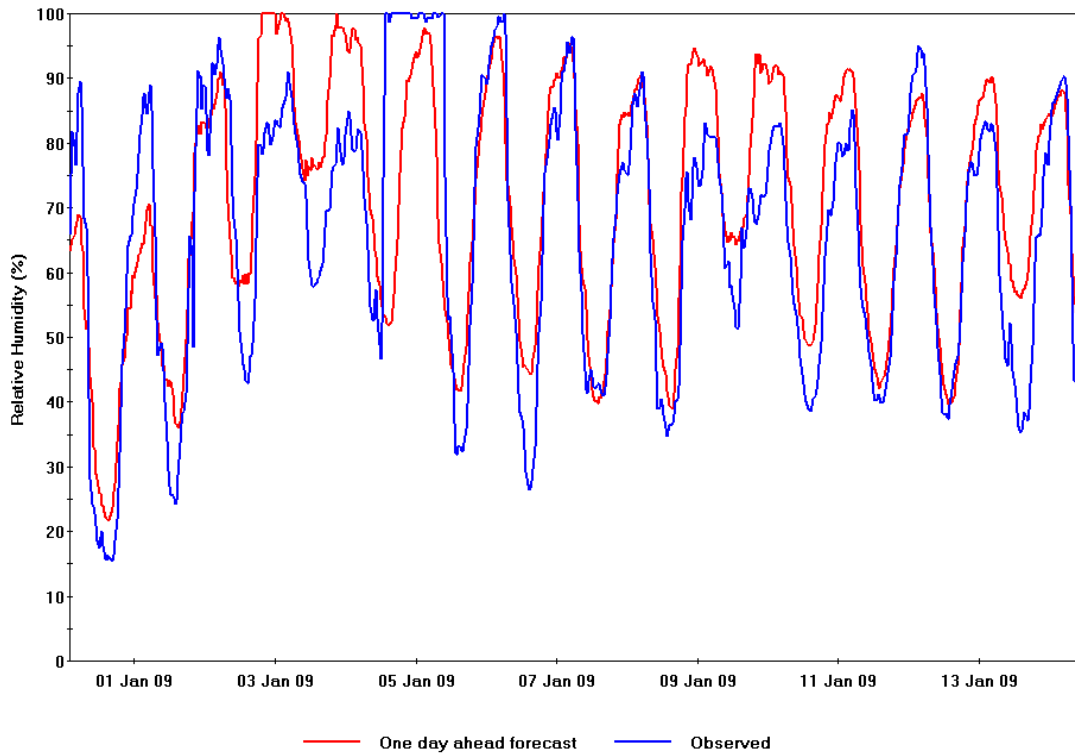
Forecast horizon		Slope	Intercept	Pearson	RMSE	IOA	Bias	Count
One day ahead	Minimum	0.48	4.83	0.61	8.51	0.77	-5.51	7374
	Average	0.79	12.51	0.84	12.10	0.91	0.40	8408
	Maximum	0.93	29.51	0.91	20.62	0.95	5.73	8480
Three day ahead	Minimum	0.34	4.20	0.44	9.41	0.67	-8.23	7202
	Average	0.72	13.90	0.79	13.98	0.88	-1.76	8170
	Maximum	0.91	36.36	0.87	24.10	0.93	3.10	8240
Six day ahead	Minimum	0.30	8.10	0.40	11.61	0.64	-9.42	6769
	Average	0.64	17.90	0.69	16.74	0.82	-2.56	7795
	Maximum	0.82	44.45	0.81	25.11	0.90	3.55	8105

**Table 5 - Summary of wind speed forecast performance for 91 sites**

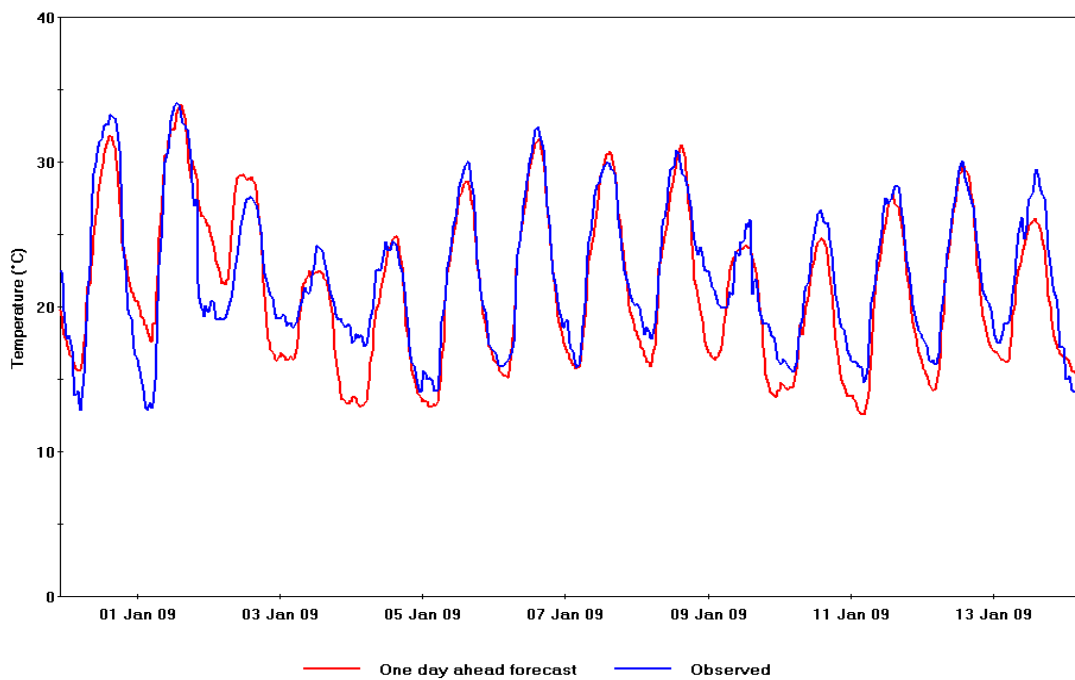
Forecast horizon		Slope	Intercept	Pearson	RMSE	IOA	Bias	Count
One day ahead	Minimum	0.21	-0.09	0.14	1.26	0.37	-2.84	7371
	Average	0.59	1.56	0.57	2.37	0.70	-0.14	8404
	Maximum	1.35	4.41	0.76	4.83	0.83	3.09	8480
Three day ahead	Minimum	0.18	0.51	0.24	1.15	0.49	-2.88	7199
	Average	0.45	1.78	0.53	2.24	0.69	-0.51	8166
	Maximum	1.03	5.81	0.66	3.69	0.8	2.4	8240
Six day ahead	Minimum	0.13	1.02	0.19	1.28	0.46	-2.95	6766
	Average	0.33	2.35	0.39	2.49	0.61	-0.48	7802
	Maximum	0.73	6.57	0.59	3.8	0.74	2.67	8105

Figures 8, 9 and 10 show scatter plots of one day ahead forecasts plotted against observed temperature, relative humidity and wind speed for Warwick. These results are typical of forecasts obtained for the other sites. The least squares regression line is also included in the figures. The quantisation of the observed wind speed is due to the BoM providing wind speed observations in km/hr quantised to 0.5 km/hr. It is evident that the gross behaviour is modelled reasonably well (except for the wind speed), however, it is not clear to what degree the discrepancies can be attributed to errors in the supplied BoM forecasts. It is envisaged that a substantial effort would be required to resolve this issue.

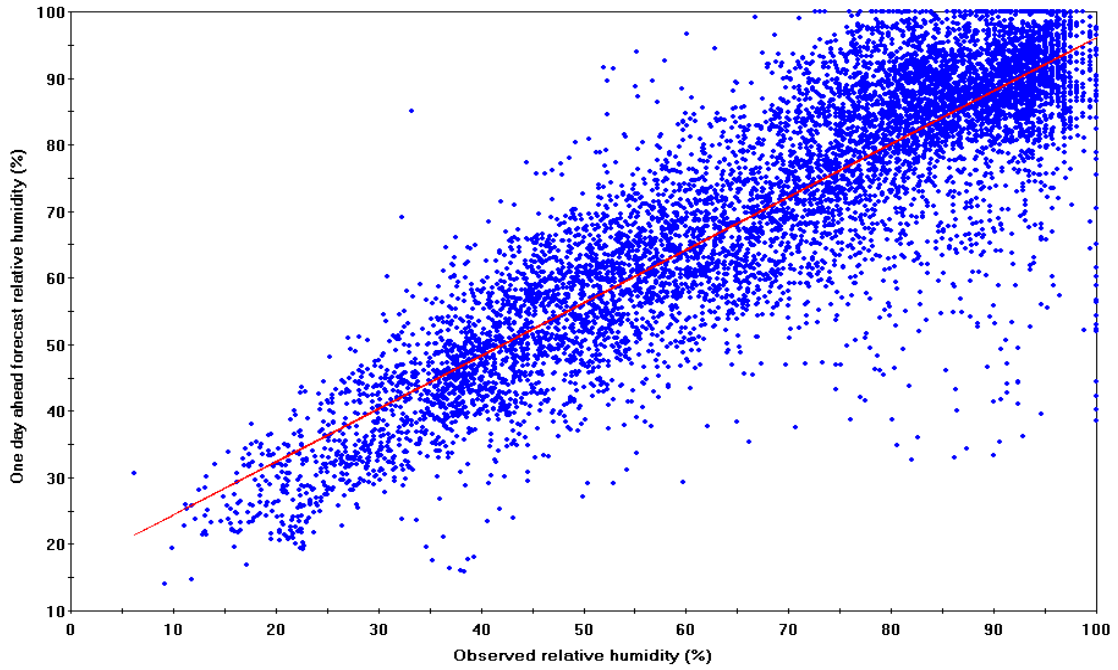
Statistics for all sites for one, three and six day ahead forecasts can be found in in Appendix E.



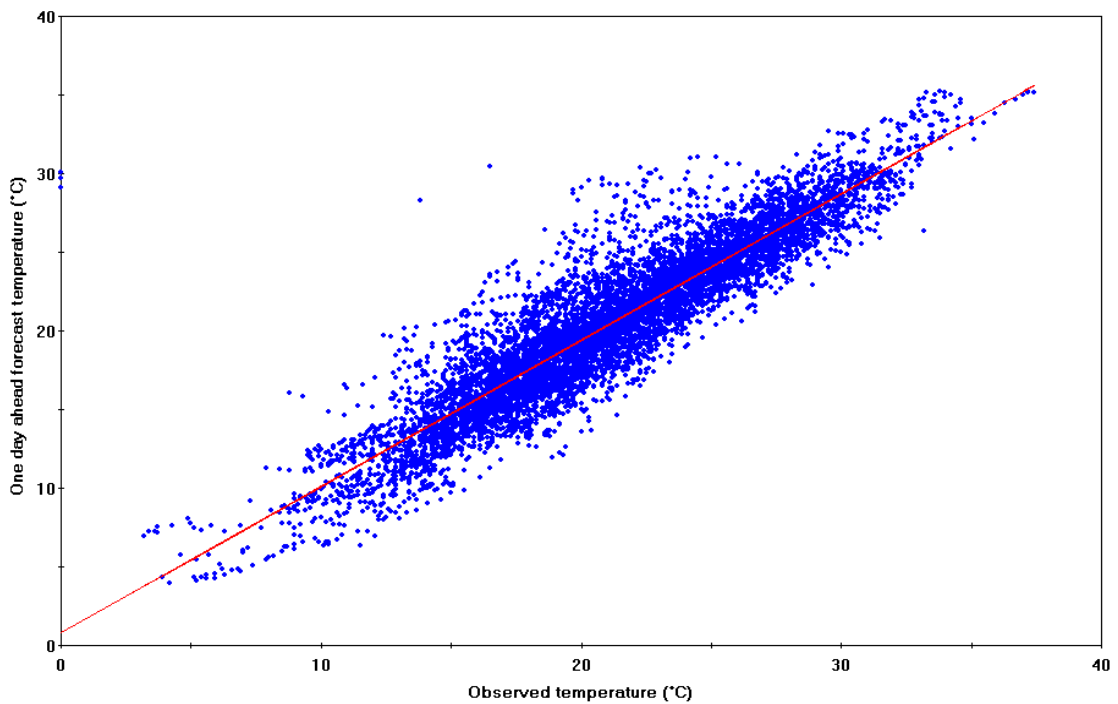
**Figure 6 - Time series of one day ahead forecast and observed relative humidity (30-minute averages) for Warwick**



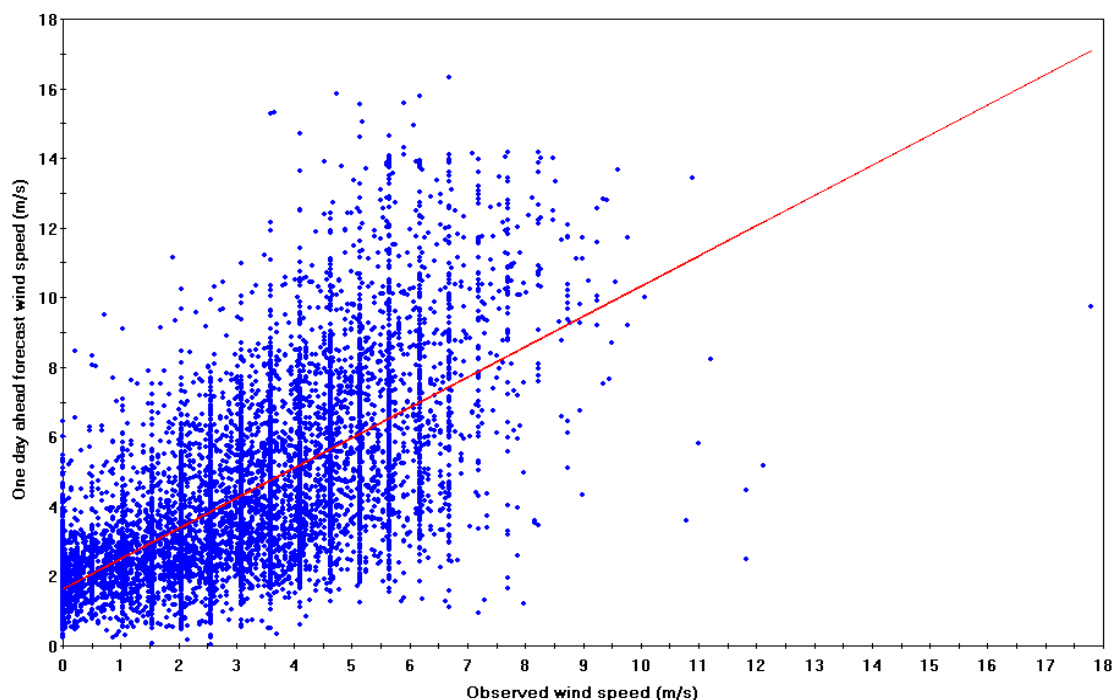
**Figure 7 - Time series of one day ahead forecast and observed temperature (30-minute averages) for Warwick**



**Figure 8 - Scatter plot of one day ahead forecast of relative humidity plotted against observed temperature for Warwick**



**Figure 9 - Scatter plot of one day ahead forecast of temperature plotted against observed relative humidity for Warwick**



**Figure 10 - Scatter plot of one day ahead forecast of wind speed plotted against observed wind speed for Warwick**

#### **4.4 Service delivery and utility**

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Forecasts of the following parameters were checked by the Katestone Environmental staff and posted to the web site [www.katestone.com.au/mla](http://www.katestone.com.au/mla) on a daily basis:

- Tables of previous six days' AHLU values obtained using HLI thresholds of 80, 83, ...95
- Tables of previous six days' minimum and maximum daily HLI value
- Tables of previous six days' rainfall
- Tables of six day forecasts of the above parameters
- Graphs of six day forecasts of HLI and AHLU for HLI thresholds of 80, 83, ...95

These forecasts were transferred to the web site on a daily basis for access by all feedlot operators. The previous six days' forecasts were also made available should the feedlot operators need to check an earlier forecast.

The implementation of the forecast model is very flexible. Any future need for forecasting at these same locations will require only a basic retraining of the models with more recent data. The addition of new sites would require correspondence with the Bureau of Meteorology in order to make the additional data available. Katestone Environmental would then need to extend the existing models to incorporate the new sites.

## **5 Conclusions**

A system for forecasting the HLI and the AHLU has been developed and implemented over the extended summer period 1 October 2008 to 31 March 2009. Modelling of the various input parameters was performed on a half hourly basis for each of the feedlot sites using the Bureau of Meteorology LAPS and GASP forecasts. The parameters generated were the temperature, wind speed and dew point. The solar radiation was calculated analytically from the date, time of day and latitude of the site.

Two factors were found to contribute to the poor AHLU forecasts. These were the performance in forecasting the HLI and the method for determining the AHLU, with the method for calculating the AHLU being the major factor.

Finally, although the forecast AHLU values were slightly lower than the values obtained from observations, the performance in predicting the risk categories is good and is more relevant as far as feedlot operations are concerned than predicting the actual AHLU values.



## **6 References**

EA Systems (2004), "FLOT. 327 – Development of a Heat Load Risk Assessment Process for the Australian feedlot industry".

Gaughan J, Goopy J and Spark J (2002), "Excessive Heat Load Index for Feedlot Cattle", University of Queensland.

Katestone Environmental (2006), 'MLA FLOT 334 Cattle Head Load Forecasting Summer 2005/2006. Report from Katestone Environmental to Meat & Livestock Australia

Katestone Scientific (2002), "FLOT. 313 – Development and trial operation of a weather forecasting service for excessive heat load events for the Australian feedlot industry."

Leonard MJ, Spiers DE and GL Hahn, (2001), "Adaptation of feedlot cattle to repeated sinusoidal heat challenge", Livestock Environment VI – Proceedings of the Sixth International Symposium, Louisville, Kentucky, May 21-23, 2001, Published by The Society for Engineering in Agriculture, Food and Biological Systems.

Oke TR (1987), "Boundary Layer Climates", Second Edition, Routledge.

## 7 Appendices

### 7.1 Appendix A

**Table A1 - sites included in the 2008/2009 summer period**

<b>New South Wales</b>			
Albury	Deniliquin Airport	Inverell Res. Ctr.	Tamworth
Armidale	Dubbo Airport	Moree	Temora Airport
Casino Airport	Forbes Airport	Mount Ginini	Trangie Res. Stn.
Cessnock	Glen Innes Airport	Mudgee Airport	Wagga Wagga
Cobar Airport	Grafton Res. Stn.	Narrabri Airport	Walgett Airport
Condobolin Airport	Griffith	Orange Airport	West Wyalong Airport
Coonamble Airport	Gunnedah Airport	Parkes Airport	Yanco
Cowra Airport	Hay	Scone Airport	Young Airport
<b>Queensland</b>			
Amberley	Gayndah Airport	Miles	St. Lawrence
Applethorpe	Gympie	Oakey	Toowoomba Airport
Ayr	Inglewood Forest	Roma	UQ Gatton
Dalby Airport	Kingaroy Airport	Rockhampton Aerodrome	Warwick
Emerald	Mareeba Airport	St. George Airport	Woolshed
<b>South Australia</b>			
Clare	Kingscote Aerodrome	Minnipa DPI	Port Augusta Aerodrome
Cleve Aerodrome	Lameroo (Austin Plains)	Padthaway South	Snowtown (Rayville Park)
Keith (Munkora)	Minlaton Aerodrome	Parafield Airport	Strathalbyn Racecourse
<b>Victoria</b>			
Avalon Airport	Dunns Hill	Nhill Aerodrome	Wangaratta Aerodrome
Bendigo Airport	Hamilton Airport	Shepparton Airport	Yarrawonga
Casterton	Hopetoun Airport	Stawell Aerodrome	
Charlton	Longerenong	Swan Hill Aerodrome	
<b>Western Australia</b>			
Bridgetown	Dalwalinu	Morawa Airport	Salmon Gums Res. Stn.
Collie East	Esperance Aerodrome	Newdegate Res. Stn.	Southern Cross Airfield
Cunderdin Airfield	Katanning	Rocky Gully	Wandering
<b>Tasmania</b>			
Warra			

## **7.2 APPENDIX B**

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### **Description of Model**

#### **B1 Preliminary considerations**

The first step in producing site-specific weather forecasts takes advantage of detailed information made readily available from well-proven numerical models in association with determined correlations of local weather variables with such numerical forecasts. The direct predictions from the traditional numerical modelling may be very useful for some variables under normal conditions but are unlikely to properly predict the detailed diurnal variations of key parameters required for constructing heat comfort indices.

Some type of expert system is needed to improve such forecasts. This could involve, for example, the use of more detailed or a wide variety of numerical models to give greater confidence in predictions or alternatively the use of a trained meteorologist to be able to estimate the likely differences between feedlot conditions and those forecast by the numerical model.

An automated approach would utilise the available database of concurrent site measurements and upper-level forecasts to determine statistically significant correlations. These correlations are then assumed to hold over forthcoming events and are used with numerical forecasts to predict feedlot conditions over the next 48-144 hours. The predicted time history of individual meteorological variables can then be combined in various ways to give a time history of a selected thermal comfort index. These index values can be screened against critical thresholds determined from field studies in order to give suitable alarms for various types of likely animal reactions.

This “downscaling” methodology (i.e. relying on a correlation procedure to produce site-specific values from a regional model prediction of atmospheric profiles) has been shown by experience elsewhere to require at least a period of 1-3 months of training data before adequate results are obtained and thereafter a regular retraining over a one year period to produce optimal results. The correlations themselves are only as good as the database upon which they are based.

For general predictions, a short database may suffice as relatively simple relationships are likely to be useful for normal conditions. Extreme conditions are less frequently encountered and may not be present in a short-term database. Given that there is considerable variability between years in general weather conditions (and even more so for extreme events), there is no guarantee that the recent past is a good guide to the forecasting of a series of adverse days, as required in heatwave analysis. The accuracy of the downscaling methodology in heatwave conditions is reliant on the ability of numerical models to accurately predict fluctuations in parameters outside the ranges for which they have been optimised and hence is expected to be limited.

#### **B2 Available data**

Over the past 30 years, many field and theoretical studies have demonstrated the sensitivity of near-surface meteorological conditions to changes in local and regional terrain characteristics. Temperatures are very sensitive to terrain elevation, distance from the nearest coastline and vegetation cover. Relative humidity is sensitive to the presence of vegetation cover, local water bodies or the coastline. Wind speed is strongly influenced by the presence of trees, hills or valleys, inland location and the aerodynamic roughness of land within 1 km of the weather station.

In contrast, numerical weather prediction models (regional forecast models) use relatively coarse terrain and land-use information and are very unlikely to capture the influences of the surface characteristics within 1-3 km of the site. On the other hand, on-site measurements will show directly the influences of the local environment by the presence of strong diurnal patterns in wind and, to a lesser extent, temperature variables. On-site weather information is often very important, especially if the nearest Bureau of Meteorology (BoM) automatic weather station is over 15-20 km away or if the feedlot environment is unusual compared to that of the region (say within 25 km).

There are several Australian agencies (hereafter referred to as “service providers”) that routinely run numerical models that could be suitable for either direct forecasts or in conjunction with an expert system using local meteorological information (that is, the prediction of parameter values at a given point from values predicted over a broader scale). These include:

The BoM operates the Global Analysis and Prediction Scheme (GASP) and Limited Area Prediction System (LAPS) models on a regular basis for their Australia-wide weather prediction service. The LAPS model covers an area of Australasia, South East Asia and much of the Indian and Pacific Oceans at various resolutions. The finest resolution (5 km) is only currently used in research work or for the use of the internal BoM consulting arm. The 25 km resolution forms the basis of most publicly-available forecasts.

The information available from these forecasts that is most applicable to the current project includes surface level (screen height) temperature, dew point, sensible and latent heat fluxes, total heat flux and a set of upper-level temperature, dew point and wind components.

By special arrangements, these forecasts can be provided for any given grid point on a three-hourly basis out to a prediction horizon of 48 hours. They do not generally take account of local weather station data from the nearest BoM AWS site. The numerical forecasts from the model are not edited or screened for reliability and are from one model run.

The GASP model provides a similar set of temperature and wind variables at a coarser resolution of 75 km on a twelve-hourly basis to a time horizon of 6 days. No local data assimilation is included at this scale.

The numerical model results can be made available relatively cheaply on a dedicated web site. Various energy companies have used such information over the past 4 years (using the Katestone downscaling software) as a basis for demand prediction and trading activities. The service has proved to be very reliable with only very infrequent excursions in some parameters. The BoM model accuracy is reported in various BoM publications.

The CSIRO runs a different type of numerical model on a regular basis for a current trial service for agricultural and energy users. The model is run at a resolution of 5 km or better to a time horizon of 8 days. The predicted variables include rainfall and cloud cover, as well as the standard temperature, wind and moisture variables.

The University of New South Wales provides a commercial prediction system to a time horizon of 7-10 days at spatial resolution to 1 km. Their approach is claimed to be a more refined model than the operational models used by the BoM and can include site-specific data assimilation. The support services and reliability are less clear as they depend on staff availability but several publications have been produced showing the very satisfactory performance in extreme events (e.g. bushfires, air quality and sailing forecasts).

### **B3 Description of model**

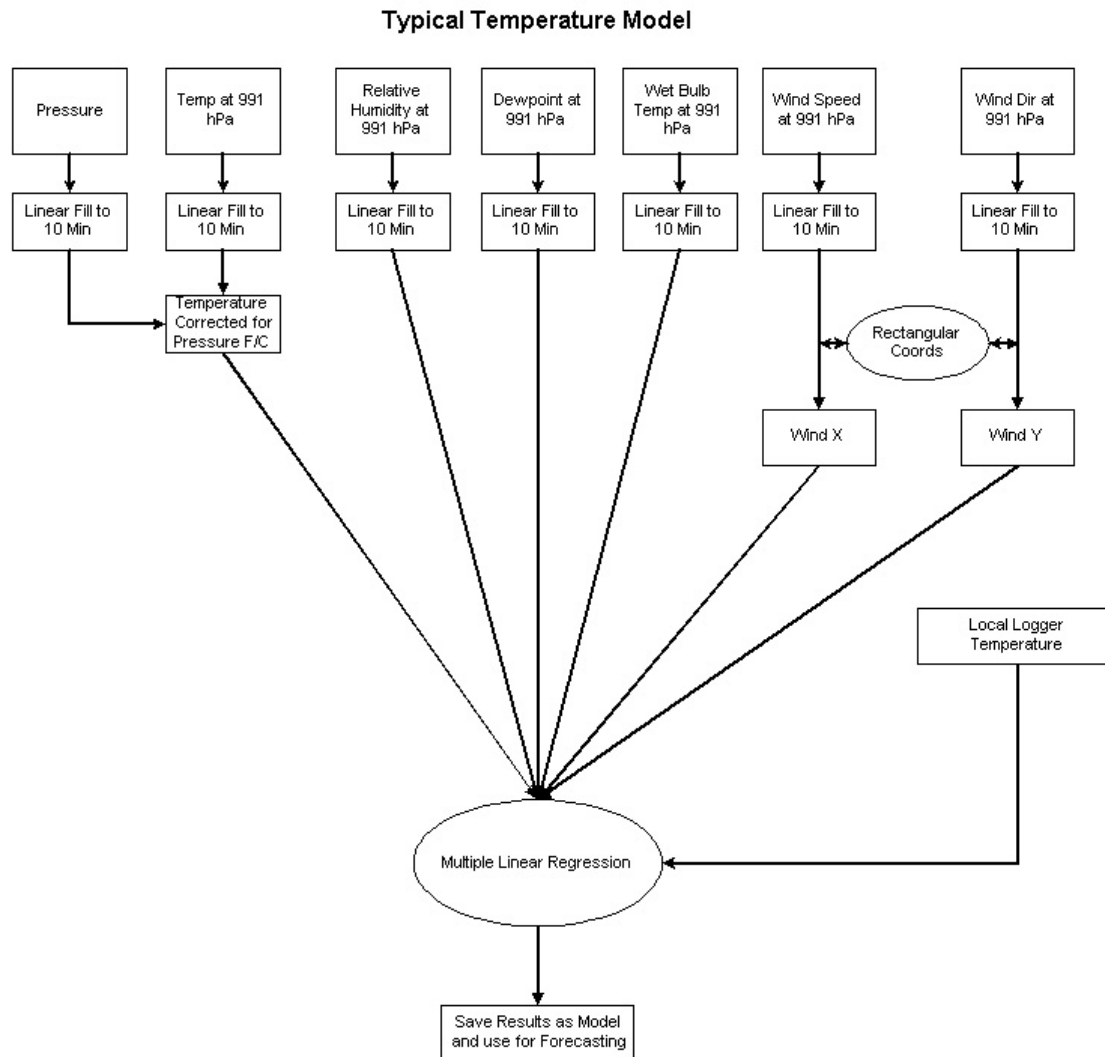
The system that was implemented was strongly based on a pre-existing and proven scheme developed by Katestone Scientific for use in energy forecasting. It consists of the following steps:

- Obtain upper-level forecast data from numerical weather prediction models via a special web-site provided by the BoM.
- Collect concurrent information from an automatic weather station close to the site of interest.
- Once a sufficient training set of information is collected, use proprietary Katestone software to develop statistical models that relate the surface measurement to a subset of the upper-level variables.
- Use these models and the most recent data to provide the necessary forecasts.

The process is illustrated in Figure B1.

Past experience has shown that an accounting of natural diurnal and seasonal cycles together with a partitioning of the data into half-hourly time steps allows relatively simple linear regression techniques to be used, rather than more complex hybrid statistical/neural network schemes often used.

The robustness of this approach was demonstrated by the error statistics Table obtained for a period of one year for various parameters and the location of Sydney and Brisbane. For example, there is a pleasing performance for temperature and windspeed, with only minor seasonal variations and the expected slow decrease in accuracy with an increasing prediction horizon.



**Figure B1 - Example of process of using LAPS/GASP data (e.g. 991 hpa parameters) in downscaling to give a surface temperature forecast**

**Table B1 - Mean Absolute Error for Sydney and Brisbane forecasts**

Variable	Season	Forecast horizon		
		1 - 2 days	3 - 4 days	5 - 6 days
Sydney Temp (°C)	Summer	1.44	1.78	2.15
	Autumn	1.26	1.72	1.88
	Winter	1.27	1.52	1.71
	Spring	1.37	1.61	2.23
Sydney Wind Speed (m/s)	Summer	1.62	1.84	1.95
	Autumn	1.54	1.56	1.60
	Winter	1.44	1.74	1.68
	Spring	1.86	2.03	2.09

### 7.3 Appendix C

#### HLI statistics

Site	One day ahead forecasts							Three day ahead forecasts							Six day ahead forecasts						
	Slope	Intercept	Pearson	RMSE	IOA	Bias	Count	Slope	Intercept	Pearson	RMSE	IOA	Bias	Count	Slope	Intercept	Pearson	RMSE	IOA	Bias	Count
Albury	0.82	12.21	0.83	5.59	0.91	-0.2	4597	0.8	15.2	0.78	6.72	0.9	1.72	4551	0.73	18.93	0.72	7.25	0.84	0.59	4260
Amberley	0.86	8.19	0.9	6.14	0.94	-1.62	7295	0.8	11.85	0.86	7.13	0.9	-2.19	7161	0.75	15.44	0.79	8.68	0.88	-2.28	6895
Armidale	0.79	12.53	0.78	6.1	0.87	-1.91	3595	0.71	20.6	0.74	6.61	0.9	1.35	3999	0.69	22.19	0.7	7.45	0.83	1.75	3891
Applethorpe	0.96	2.56	0.91	4.75	0.95	-0.42	5813	0.92	4.99	0.88	5.42	0.9	-0.13	5565	0.87	9.39	0.81	6.93	0.9	0.35	5252
Avalon	0.85	10.17	0.82	5.78	0.91	0.08	3739	0.78	16.1	0.78	6.52	0.9	1.9	3579	0.67	23.34	0.67	7.69	0.82	1.42	3392
Ayr DPI	0.88	9.58	0.86	7.08	0.93	0.17	8326	0.86	11.23	0.86	7.03	0.9	0.53	8101	0.84	12.82	0.85	7.29	0.92	0.34	7694
Bridgetown	0.92	4.69	0.87	4.83	0.93	-0.74	4977	0.86	8.97	0.79	6.39	0.9	0.09	4921	0.75	15.97	0.67	7.86	0.82	-0.74	4426
Bendigo	0.9	7.55	0.86	4.77	0.92	0.7	3717	0.88	9.94	0.82	5.72	0.9	1.68	3689	0.71	20.24	0.7	6.72	0.83	0.76	3389
Cobar	0.96	3.48	0.9	4.64	0.94	0.76	5247	0.92	7.36	0.86	5.61	0.9	1.64	5102	0.82	14.04	0.78	6.53	0.88	1.21	4653
Condoblin	0.91	5.56	0.87	5.07	0.93	-0.97	4764	0.79	13.5	0.8	5.79	0.9	-1.08	4506	0.7	19.55	0.72	6.93	0.83	-2.12	4149
Cessnock	0.8	11.31	0.85	6.85	0.91	-2.12	6194	0.83	13.63	0.86	6.65	0.9	2.01	6586	0.81	14.92	0.82	7.48	0.9	1.98	6386
Charlton	0.91	4.52	0.88	4.53	0.93	-1.42	3773	0.86	9.66	0.84	5.07	0.9	0.5	3945	0.74	16.84	0.74	6.21	0.86	-0.49	3621
Collie East	0.9	5.62	0.88	4.96	0.93	-0.72	4925	0.85	10.25	0.78	6.95	0.9	0.62	4849	0.74	17.09	0.66	8.39	0.81	-0.39	4336
Clare High School	0.76	14.08	0.75	6.19	0.85	-1.9	3630	0.89	9.27	0.8	6.02	0.9	2.05	3837	0.76	16.96	0.71	6.59	0.84	0.76	3487
Coonamble	0.94	4.17	0.9	5.03	0.95	-0.12	5647	0.89	7	0.87	5.52	0.9	-0.69	5436	0.79	14.6	0.78	6.85	0.88	-0.9	4910
Casino	0.94	3.3	0.92	5.2	0.96	-0.94	7508	0.91	6.23	0.9	5.68	1	-0.17	7254	0.88	8	0.87	6.59	0.93	-0.33	6817
Casterton	0.88	8.48	0.83	5.6	0.91	0.5	3593	0.82	12.89	0.79	6.13	0.9	1.32	3512	0.68	20.6	0.67	7.44	0.82	0.15	3262
Cunderdin	0.91	5.39	0.88	4.79	0.94	-0.67	4947	0.9	6.91	0.85	5.45	0.9	0.4	4844	0.75	17	0.73	7.12	0.85	-0.06	4355
Cleve	0.88	8.11	0.87	4.52	0.93	0.16	4090	0.8	14.15	0.8	5.51	0.9	0.89	3923	0.65	22.5	0.67	6.78	0.81	-1.02	3585
Cowra	0.95	3.84	0.89	5	0.94	0.19	5075	0.93	5.15	0.85	5.81	0.9	0.58	4829	0.82	12.22	0.76	7.14	0.87	-0.17	4402
Dubbo	0.91	5.95	0.88	4.97	0.94	-0.27	4980	0.88	7.96	0.86	5.44	0.9	-0.26	4733	0.79	13.93	0.76	6.74	0.87	-0.76	4353
Dalby	0.95	3.01	0.93	4.71	0.96	-0.28	6264	0.93	4.64	0.9	5.33	1	0.08	6048	0.9	7.27	0.85	6.51	0.92	0.43	5653
Mudgee	0.93	5.03	0.89	5.11	0.94	0.12	5345	0.88	8.43	0.85	6	0.9	0.19	5031	0.8	13.4	0.76	7.54	0.87	-0.29	4606
Dunns Hill	0.87	8.76	0.82	5.69	0.91	0.47	3298	0.84	10.47	0.76	6.84	0.9	0.78	3112	0.72	17.86	0.64	8.28	0.8	0.25	2952
Deniliquin	0.91	6.69	0.9	4.15	0.94	0.64	4239	0.91	8.52	0.85	5.85	0.9	2.65	4244	0.76	17.83	0.74	6.55	0.85	1.32	3893
Dalwallinu	0.87	8.37	0.87	4.7	0.93	-0.72	4959	0.86	9.59	0.83	5.43	0.9	0.37	4847	0.72	19.45	0.72	6.71	0.85	0.11	4380
Emerald	0.89	4.27	0.89	6.9	0.92	-3.85	7039	0.84	7.68	0.88	7.32	0.9	-4.08	7029	0.8	10.39	0.84	8.14	0.89	-4.2	6670
Esperance	0.78	13.43	0.83	5.81	0.91	-1	4605	0.83	12.25	0.8	6.36	0.9	0.92	4483	0.66	22.13	0.67	7.89	0.82	-0.42	4118

Site	One day ahead forecasts							Three day ahead forecasts							Six day ahead forecasts						
	Slope	Intercept	Pearson	RMSE	IOA	Bias	Count	Slope	Intercept	Pearson	RMSE	IOA	Bias	Count	Slope	Intercept	Pearson	RMSE	IOA	Bias	Count
Forbes	0.94	3.81	0.88	4.85	0.94	-0.04	4927	0.89	8.4	0.85	5.43	0.9	0.61	4694	0.75	17.39	0.73	6.73	0.85	0.05	4306
Gayndah	0.92	4.74	0.92	5.11	0.96	-0.74	7494	0.87	8.5	0.9	5.62	1	-0.6	7271	0.84	10.36	0.86	6.64	0.93	-0.81	6881
Griffith	0.87	7.21	0.89	4.56	0.93	-1.99	4418	0.8	12.7	0.84	4.99	0.9	-0.99	4377	0.7	19.44	0.75	6.3	0.85	-1.74	4080
Grafton	0.94	3.09	0.93	5.16	0.96	-1.07	6489	0.93	4.97	0.91	5.61	1	0	6376	0.9	6.48	0.89	6.28	0.94	-0.33	5940
Glen Innes	0.89	7.41	0.85	5.53	0.92	0.31	4547	0.79	14.24	0.79	6.22	0.9	0.35	4263	0.73	19.05	0.7	7.49	0.83	0.72	4037
UQ Gatton	0.95	2.83	0.93	4.92	0.96	-0.38	7161	0.94	4.39	0.92	5.47	1	-0.06	6916	0.9	7.4	0.87	6.61	0.93	0.06	6459
Gunnedah	0.98	1.12	0.91	5.02	0.95	-0.36	5522	0.91	5.24	0.87	5.64	0.9	-0.91	5081	0.83	10.89	0.78	7.05	0.88	-1.05	4699
Gympie	0.93	4.16	0.92	5.4	0.96	-0.85	7950	0.89	7.14	0.9	5.99	1	-0.75	7701	0.86	8.81	0.87	6.97	0.93	-0.86	7314
Hamilton	0.89	7.99	0.84	5.08	0.91	0.85	3123	0.81	14.01	0.78	5.95	0.9	1.68	3115	0.68	21.35	0.68	6.91	0.82	0.83	2860
Hopetoun	0.92	6.68	0.9	4.35	0.94	1.18	4103	0.86	11.03	0.85	5.27	0.9	1.76	4017	0.72	18.96	0.73	6.42	0.85	0.33	3734
Hay CSIRO	0.86	8.28	0.89	4.47	0.93	-1.42	4305	0.79	13.46	0.84	5.15	0.9	-0.81	4278	0.69	19.75	0.75	6.35	0.86	-1.53	3953
Inglewood Forest	0.9	6.53	0.88	5.67	0.94	-0.38	5517	0.85	9.88	0.84	6.51	0.9	-0.69	5226	0.79	14.85	0.76	7.89	0.87	-0.02	5020
Inverell Research Centre	0.92	5.8	0.87	6.06	0.93	0.37	5520	0.87	8.94	0.85	6.38	0.9	0.21	5347	0.83	12.46	0.79	7.35	0.89	0.77	4955
Keith (Munkora)	0.88	8.19	0.86	4.95	0.92	0.22	4052	0.87	9.72	0.82	5.69	0.9	1.13	3959	0.73	17.64	0.73	6.55	0.85	-0.43	3649
Kingscote	0.87	8.25	0.83	5.02	0.91	-0.23	3884	0.82	12.08	0.79	5.59	0.9	0.32	3750	0.68	20.2	0.65	7.09	0.8	-1.38	3435
Kingaroy	0.9	5.58	0.92	5.38	0.96	-1.59	7147	0.86	8.44	0.9	5.98	0.9	-1.34	6996	0.82	11.21	0.85	6.97	0.92	-1.27	6566
Katanning	0.77	12.69	0.77	6.21	0.86	-2.45	3551	0.75	16.15	0.74	6.04	0.9	-0.14	3600	0.61	25.33	0.61	7.25	0.79	-0.15	3233
Longerenong	0.94	5.27	0.87	4.54	0.93	1.02	3662	0.89	8.73	0.82	5.43	0.9	1.57	3608	0.74	17.51	0.7	6.53	0.83	0.13	3351
Lameroo (Austin Plains)	0.86	10.05	0.87	4.51	0.93	0.72	3912	0.88	9.27	0.83	5.42	0.9	1.58	3829	0.7	20.44	0.72	6.21	0.84	0.01	3514
Mount Ginini	0.89	6.58	0.83	4.75	0.91	-0.05	2055	0.81	11.56	0.76	5.68	0.9	0.07	1983	0.66	21	0.64	6.98	0.8	0.56	1632
Miles Constance Street	0.89	5.83	0.88	6.07	0.93	-1.94	6775	0.83	12.18	0.87	6.15	0.9	0.33	6814	0.8	14.73	0.82	7.17	0.91	0.69	6564
Minnipa DPI	0.85	10.45	0.87	4.46	0.93	0.04	4282	0.85	10.52	0.82	5.34	0.9	0.71	4139	0.7	19.23	0.73	6.3	0.85	-1.09	3845
Mareeba	0.86	7.55	0.91	6.5	0.95	-2.57	8337	0.85	8.76	0.91	6.49	0.9	-2.35	8092	0.83	10.09	0.89	7.06	0.93	-2.73	7689
Moree	0.84	9.57	0.84	6.04	0.91	-1.7	5382	0.8	14.48	0.84	6.02	0.9	0.62	5639	0.73	20.29	0.77	7.11	0.87	0.93	5335
Morawa	0.92	4.82	0.89	4.67	0.94	-0.7	5438	0.89	7.59	0.87	5.14	0.9	-0.34	5348	0.79	14.38	0.78	6.48	0.88	-0.53	4930
Narrabri	0.98	1.16	0.89	5.18	0.94	-0.54	5512	0.95	3.05	0.87	5.65	0.9	-0.51	5253	0.87	9.21	0.78	6.79	0.88	-0.58	4804
Newdegate Research Station	0.87	7.62	0.86	4.79	0.92	-1.15	4039	0.87	9.15	0.8	5.7	0.9	0.63	3962	0.68	20.49	0.65	7.31	0.81	-0.43	3516
Young	0.95	3.73	0.88	4.81	0.94	0.35	4573	0.91	7.14	0.83	5.78	0.9	0.97	4314	0.8	13.69	0.72	7.1	0.85	0.15	3989
Nhill	0.9	7.3	0.89	4.09	0.94	0.71	3768	0.88	9.47	0.84	5.11	0.9	1.34	3733	0.7	19.71	0.71	6.33	0.84	-0.07	3430
Scone	0.91	5.26	0.9	5.48	0.95	-0.67	6311	0.89	7.66	0.87	6.33	0.9	0.14	6187	0.85	10.37	0.79	8.12	0.89	-0.19	5660
Orange	0.91	6.05	0.86	5	0.93	0.07	3902	0.79	14.47	0.74	6.75	0.9	0.53	3513	0.67	21.43	0.63	8.02	0.79	-0.33	3231



Site	One day ahead forecasts							Three day ahead forecasts							Six day ahead forecasts						
	Slope	Intercept	Pearson	RMSE	IOA	Bias	Count	Slope	Intercept	Pearson	RMSE	IOA	Bias	Count	Slope	Intercept	Pearson	RMSE	IOA	Bias	Count
Oakey	0.84	8.97	0.89	5.66	0.93	-2.29	5416	0.82	10.84	0.89	5.48	0.9	-1.57	5673	0.79	13.24	0.84	6.54	0.91	-1.27	5381
Parafield	0.88	8.61	0.86	4.73	0.92	0.36	4391	0.85	11.14	0.82	5.31	0.9	1.01	4207	0.72	18.73	0.72	6.34	0.84	-0.6	3876
Parkes	0.9	7.27	0.84	5.5	0.92	0.46	4799	0.84	12.08	0.79	6.32	0.9	0.89	4521	0.72	19.79	0.69	7.32	0.83	0.47	4201
Padthaway South	0.89	7.13	0.85	5.24	0.92	0.14	4097	0.84	11.64	0.8	5.95	0.9	1.04	3952	0.71	18.75	0.71	7.02	0.84	-0.6	3653
Port Augusta	0.9	7.24	0.87	4.63	0.93	0.35	4765	0.86	11.03	0.82	5.41	0.9	1.13	4596	0.71	19.92	0.72	6.4	0.84	-0.28	4316
Rocky Gully	0.87	7.34	0.86	4.66	0.93	-0.67	4246	0.83	11.16	0.79	6.05	0.9	0.61	4163	0.65	22.07	0.61	8	0.79	-0.2	3719
Roma	0.88	6.73	0.88	5.82	0.93	-1.63	5870	0.84	9.99	0.87	5.95	0.9	-1.26	5875	0.77	15.94	0.8	7.05	0.89	-0.64	5633
Rockhampton	0.92	4.57	0.91	5.78	0.95	-1.01	8269	0.89	6.79	0.9	6.2	1	-0.83	7999	0.86	9.23	0.86	7.04	0.93	-1.02	7598
St. George	0.77	16.26	0.8	8.46	0.89	-0.18	6769	0.77	17.68	0.77	9.19	0.9	1.25	6624	0.73	21.08	0.73	10.1	0.85	1.67	6311
Shepparton	0.9	7.04	0.88	4.61	0.94	0.39	4079	0.84	12.02	0.82	5.9	0.9	1.51	4030	0.73	18.91	0.73	6.6	0.85	0.27	3723
Strathalbyn Racecourse	0.83	11.67	0.83	5.22	0.91	0.25	3859	0.82	12.87	0.79	5.81	0.9	0.89	3647	0.69	20.48	0.68	7.01	0.82	-0.41	3417
St. Lawrence	0.89	6.58	0.9	6.23	0.95	-1.83	8360	0.84	10.52	0.87	6.97	0.9	-1.13	8130	0.82	12.02	0.85	7.37	0.92	-1.59	7705
Salmon Gums Research Station	0.81	11.31	0.83	5.41	0.9	-1.33	4239	0.84	11.05	0.79	6.22	0.9	0.58	4230	0.65	22.48	0.63	7.97	0.79	-0.61	3865
Snowtown (Rayville Park)	0.9	6.68	0.89	4.01	0.94	-0.02	4027	0.87	9.33	0.84	4.94	0.9	0.67	3873	0.73	18.1	0.74	5.97	0.85	-0.73	3651
Southern Cross	0.92	4.79	0.89	4.56	0.94	-0.35	4743	0.88	9.45	0.83	5.72	0.9	1.26	4624	0.68	22.23	0.7	7.15	0.84	0.62	4170
Stawell	0.92	5.77	0.87	4.87	0.93	0.54	3762	0.85	11.27	0.8	5.97	0.9	1.5	3649	0.73	18.19	0.69	7.1	0.83	0.22	3376
Swan Hill	0.89	8.34	0.87	4.74	0.93	0.77	4184	0.83	12.62	0.82	5.71	0.9	1.18	4110	0.75	16.76	0.74	6.41	0.86	0.14	3775
Temora	0.97	2.43	0.88	4.8	0.94	0.59	4650	0.94	4.87	0.82	6.04	0.9	0.96	4336	0.83	12.15	0.72	7.13	0.84	0.06	3976
Trangie Research Station	0.93	4.5	0.89	4.99	0.94	-0.2	5479	0.89	7.2	0.87	5.47	0.9	-0.55	5250	0.77	15.68	0.77	6.87	0.88	-0.56	4832
Toowoomba	0.89	7.83	0.86	5.65	0.93	-0.13	4974	0.83	12.04	0.82	6.4	0.9	0.08	4813	0.75	17.93	0.73	7.77	0.85	0.64	4610
Tamworth	0.8	11.07	0.88	5.86	0.92	-2.82	5123	0.82	13.14	0.87	5.56	0.9	0.31	5325	0.75	18.14	0.8	6.73	0.89	0.66	4989
Warwick	0.9	5.69	0.91	5.25	0.95	-1.45	6269	0.89	7.2	0.91	5.14	1	-0.57	6259	0.86	9.79	0.85	6.54	0.92	-0.09	5955
Wandering	0.92	5.26	0.87	4.79	0.93	-0.1	4695	0.91	6.5	0.83	5.74	0.9	0.42	4575	0.74	17.25	0.69	7.4	0.83	-0.02	4021
Wagga Wagga	0.96	3.18	0.89	4.68	0.94	0.48	4626	0.9	8.84	0.82	6.25	0.9	2.09	4464	0.81	14.31	0.74	6.93	0.85	1.07	4126
Walgett	0.92	5.96	0.88	5.37	0.94	0.27	5538	0.84	11.89	0.83	6.33	0.9	0.4	5348	0.75	19.03	0.73	7.63	0.85	0.54	4846
Wangaratta	0.9	7.81	0.86	4.99	0.93	1.02	4319	0.85	12.89	0.8	6.56	0.9	2.57	4289	0.77	17.09	0.74	6.88	0.85	1.5	4024
Woolshed	0.92	4.52	0.93	5.38	0.96	-1.55	8294	0.91	5.24	0.92	5.83	1	-1.46	8134	0.88	7.21	0.9	6.28	0.95	-1.77	7702
Warra	0.69	16.7	0.77	5.21	0.87	-1.29	2325	0.71	15.67	0.71	6.17	0.8	-1.51	2134	0.46	30.9	0.44	8.8	0.68	-0.9	1802
West Wyalong	0.95	4.15	0.89	4.59	0.94	0.49	4948	0.88	9.3	0.85	5.51	0.9	1.15	4788	0.77	16.97	0.74	6.84	0.85	0.59	4350
Minlaton	0.91	6.18	0.85	4.56	0.92	0.08	3965	0.82	12.77	0.8	5.2	0.9	0.79	3890	0.71	18.75	0.71	6.05	0.84	-0.85	3596
Yanco Agricultural Institute	0.85	8.56	0.88	4.69	0.93	-1.98	4489	0.77	15.76	0.82	5.36	0.9	0.18	4467	0.7	20.03	0.74	6.43	0.85	-0.88	4185
Yarrowonga	0.92	6.53	0.89	4.34	0.94	1.09	4205	0.84	13.55	0.82	6.07	0.9	2.85	4198	0.76	18.32	0.74	6.53	0.85	1.79	3918

## 7.4 Appendix D

### AHLU Prediction Errors

Table D1: AHLU prediction error for a HLI cut-off of 86

Site	Error (One-day ahead)							Error (Three-day ahead)							Error (Six-day ahead)						
	-3	-2	-1	0	1	2	3	-3	-2	-1	0	1	2	3	-3	-2	-1	0	1	2	3
Albury	0	0	2.19	97.27	0.55	0	0	0	0	2.19	95.63	2.19	0	0	0	0	2.73	96.17	1.09	0	0
Amberley	2.19	0.55	7.65	83.61	3.83	1.64	0.55	2.19	1.09	9.84	82.51	2.19	2.19	0	3.28	1.09	9.29	78.69	6.56	0.55	0.55
Armidale	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Applethorpe	0	0	0.55	98.91	0.55	0	0	0	0	0.55	98.91	0.55	0	0	0	0	0.55	99.45	0	0	0
Avalon	0	0	0	98.91	1.09	0	0	0	0	0	97.27	2.73	0	0	0	0	1.09	97.81	1.09	0	0
Ayr DPI	1.64	2.73	3.83	66.12	13.11	8.2	4.37	0.55	2.19	2.73	71.58	12.02	4.92	6.01	2.73	10.93	17.49	55.74	8.74	2.73	1.64
Bridgetown	0	0	0	98.91	0.55	0.55	0	0	0	0.55	98.36	0.55	0.55	0	0	0	0.55	98.91	0	0.55	0
Bendigo	0	0	0	98.91	1.09	0	0	0	0	0	97.81	2.19	0	0	0	0	1.09	98.91	0	0	0
Cobar	0	0	0	93.99	4.92	1.09	0	0	0	0	93.44	6.56	0	0	0	0	0.55	95.08	3.28	1.09	0
Condobolin	0	0	1.09	97.81	1.09	0	0	0	0	2.73	96.17	1.09	0	0	0	0	3.28	95.08	1.64	0	0
Cessnock	0	0	3.83	96.17	0	0	0	0	0	3.83	94.54	1.64	0	0	0	0	1.64	95.63	2.73	0	0
Charlton	0	0	0.55	98.91	0.55	0	0	0	0	1.64	96.72	1.09	0.55	0	0	0.55	1.64	97.27	0.55	0	0
Collie East	0	0	0	98.91	0.55	0.55	0	0	0	0.55	98.36	0.55	0.55	0	0	0	0.55	97.81	1.09	0.55	0
Clare High School	0	0	0.55	99.45	0	0	0	0	0	0.55	97.27	2.19	0	0	0	0	0	99.45	0.55	0	0
Coonamble	0	0	1.09	95.63	3.28	0	0	0	0.55	1.64	95.08	2.73	0	0	0	0.55	1.64	95.08	2.73	0	0
Casino	0	0	4.37	89.62	5.46	0.55	0	0	0.55	6.01	85.25	6.56	1.64	0	0	1.09	7.1	80.87	9.29	1.64	0
Casterton	0	0	0	98.91	1.09	0	0	0	0	0	98.91	1.09	0	0	0	0	0	99.45	0.55	0	0
Cunderdin	0	0	0.55	97.27	1.64	0.55	0	0	0	1.09	93.99	4.37	0.55	0	0	0	1.09	97.81	1.09	0	0
Cleve	0	0	0	98.36	1.09	0.55	0	0	0	0.55	98.91	0.55	0	0	0	0	1.09	98.36	0.55	0	0
Cowra	0	0	0	95.63	3.83	0.55	0	0	0	0.55	95.63	2.73	1.09	0	0	0	0.55	95.63	3.28	0.55	0
Dubbo	0	0	0	97.27	2.73	0	0	0	0	0	99.45	0.55	0	0	0	0	0.55	97.81	1.64	0	0
Dalby	0	0	0	96.72	3.28	0	0	0	0	0.55	93.44	6.01	0	0	0	0	0.55	90.71	7.1	1.64	0
Mudgee	0	0	0	97.81	2.19	0	0	0	0	1.09	98.36	0.55	0	0	0	0	1.09	96.17	2.19	0.55	0
Dunns Hill	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Deniliquin	0	0	0	97.27	2.73	0	0	0	0	0	94.54	4.37	1.09	0	0	0	1.09	96.17	2.73	0	0
Dalwallinu	0	0	0.55	99.45	0	0	0	0	0	1.09	96.72	2.19	0	0	0	0	1.09	98.36	0.55	0	0
Emerald	1.09	6.01	17.49	73.77	1.09	0.55	0	1.09	7.1	15.85	74.32	0.55	1.09	0	2.73	6.56	14.75	74.32	1.64	0	0

Site	Error (One-day ahead)							Error (Three-day ahead)							Error (Six-day ahead)						
Esperance	0	0	0	100	0	0	0	0	0	0	98.91	1.09	0	0	0	0	0	100	0	0	0
Forbes	0	0	0	94.54	5.46	0	0	0	0	0	96.72	2.73	0.55	0	0	0	0.55	96.17	3.28	0	0
Gayndah	0	0.55	7.65	89.07	2.73	0	0	0	1.09	7.65	87.43	3.83	0	0	0	1.64	8.2	87.43	2.73	0	0
Griffith	0	0	3.28	96.72	0	0	0	0	0	4.37	95.63	0	0	0	0	0	4.37	95.63	0	0	0
Grafton	0	0.55	2.19	91.26	5.46	0.55	0	0	0.55	3.28	85.25	7.65	2.73	0.55	0	0.55	3.83	84.15	8.74	2.73	0
Glen Innes	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
UQ Gatton	0	0	3.83	86.34	8.2	1.64	0	0	0.55	4.92	84.15	7.65	1.64	1.09	0	2.19	6.56	78.69	9.29	3.28	0
Gunnedah	0	0	0.55	96.17	2.73	0.55	0	0	0	1.64	96.72	1.64	0	0	0	0	1.09	96.17	2.73	0	0
Gympie	0	0.55	12.02	77.6	8.74	1.09	0	0	2.19	12.02	78.69	6.01	1.09	0	0.55	2.19	14.75	71.58	5.46	5.46	0
Hamilton	0	0	0	98.91	1.09	0	0	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0
Hopetoun	0	0	0	97.27	2.73	0	0	0	0	1.09	95.63	3.28	0	0	0	0.55	1.64	97.27	0.55	0	0
Hay CSIRO	0	0	3.83	95.63	0.55	0	0	0	0	3.83	96.17	0	0	0	0	0.55	4.92	94.54	0	0	0
Inglewood Forest	0	0	0.55	97.81	1.64	0	0	0	0	1.64	95.63	0.55	1.64	0.55	0	0	2.19	92.9	4.37	0	0.55
Inverell Research Centre	0	0	0	98.91	1.09	0	0	0	0	0.55	98.36	0.55	0.55	0	0	0	1.09	96.17	2.73	0	0
Keith (Munkora)	0	0	0	98.91	1.09	0	0	0	0.55	0	95.63	3.83	0	0	0	0	1.64	97.81	0.55	0	0
Kingscote	0	0	0	98.91	1.09	0	0	0	0	0	98.91	1.09	0	0	0	0	0	100	0	0	0
Kingaroy	0.55	6.56	4.92	85.25	1.64	1.09	0	1.64	4.92	6.01	82.51	4.37	0.55	0	2.19	4.37	4.92	85.25	3.28	0	0
Katanning	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Longerenong	0	0	0	98.36	1.64	0	0	0	0	0.55	97.81	1.09	0.55	0	0	0	1.09	98.91	0	0	0
Lameroo (Austin Plains)	0	0	0	98.36	1.64	0	0	0	0	0.55	95.08	3.28	1.09	0	0	0	1.09	98.91	0	0	0
Mount Ginini	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Miles Constance Street	0	0	3.83	92.35	2.19	1.09	0.55	0	0	3.28	89.07	4.37	2.73	0.55	0	0.55	3.28	86.89	7.1	1.64	0.55
Minnipa DPI	0	0	1.64	96.72	1.64	0	0	0	0	0.55	97.27	2.19	0	0	0	0	1.64	97.27	1.09	0	0
Mareeba	1.64	13.66	27.87	55.74	1.09	0	0	1.09	16.39	21.86	55.74	4.92	0	0	1.64	18.58	25.14	53.01	1.09	0	0.55
Moree	0	0	1.64	97.27	1.09	0	0	0	0.55	1.64	95.63	2.19	0	0	0	0.55	1.64	96.17	1.64	0	0
Morawa	0	0	2.73	93.99	3.28	0	0	0	0	2.73	92.35	4.92	0	0	0	0	2.19	96.72	1.09	0	0
Narrabri	0	0	0	96.72	2.19	1.09	0	0	0	0.55	95.63	3.83	0	0	0	0	0.55	96.17	3.28	0	0
Newdegate Research Station	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Young	0	0	0	96.17	3.83	0	0	0	0	0	97.81	1.64	0.55	0	0	0	0	97.81	2.19	0	0
Nhill	0	0	0	98.91	1.09	0	0	0	0	0.55	96.17	2.73	0.55	0	0	0	1.64	98.36	0	0	0
Scone	0	0.55	3.83	91.26	3.28	1.09	0	0	0.55	3.83	85.79	9.29	0.55	0	0	0.55	3.28	86.34	7.65	1.64	0.55
Orange	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Oakey	0	0	0.55	98.91	0.55	0	0	0	0	1.09	98.36	0.55	0	0	0	0	1.09	98.91	0	0	0

Site	Error (One-day ahead)							Error (Three-day ahead)							Error (Six-day ahead)						
Parafield	0	0	1.09	98.36	0.55	0	0	0	0.55	0.55	96.72	2.19	0	0	0	0	1.09	98.91	0	0	0
Parkes	0	0	0.55	97.81	1.64	0	0	0	0	0	99.45	0.55	0	0	0	0	0.55	97.81	1.64	0	0
Padthaway South	0	0	0	97.81	2.19	0	0	0	0	0.55	96.17	2.73	0.55	0	0	0	0.55	98.91	0.55	0	0
Port Augusta	0	0	1.09	98.36	0.55	0	0	0	0.55	1.09	96.72	1.64	0	0	0	0.55	3.28	95.63	0.55	0	0
Rocky Gully	0	0	0	100	0	0	0	0	0	0	99.45	0.55	0	0	0	0	0	99.45	0.55	0	0
Roma	0	0	0.55	97.81	1.64	0	0	0	0	1.64	96.72	1.09	0.55	0	0	0	1.64	96.17	2.19	0	0
Rockhampton	0	2.19	12.57	70.49	13.11	1.09	0.55	0.55	1.09	13.11	69.4	9.84	4.37	1.64	2.73	4.92	13.11	68.31	5.46	4.92	0.55
St. George	7.1	7.65	3.28	68.85	8.74	3.28	1.09	8.74	6.56	3.28	54.1	14.21	9.29	3.83	8.74	6.56	4.92	51.37	16.94	9.29	2.19
Shepparton	0	0	0	99.45	0.55	0	0	0	0	0.55	99.45	0	0	0	0	0	2.19	97.81	0	0	0
Strathalbyn Racecourse	0	0	0	98.91	1.09	0	0	0	0	0.55	98.91	0.55	0	0	0	0	0	99.45	0.55	0	0
St. Lawrence	5.46	10.38	25.68	52.46	3.28	1.64	1.09	4.37	9.29	15.3	59.56	4.92	2.73	3.83	12.57	11.48	20.22	50.82	2.73	1.64	0.55
Salmon Gums Research Station	0	0	0.55	99.45	0	0	0	0	0	0	97.81	2.19	0	0	0	0	0.55	98.91	0.55	0	0
Snowtown (Rayville Park)	0	0	1.09	98.36	0.55	0	0	0	0	1.09	97.27	1.64	0	0	0	0	1.09	98.91	0	0	0
Southern Cross	0	0	0	98.91	1.09	0	0	0	0	1.09	95.63	2.73	0.55	0	0	0	1.09	98.91	0	0	0
Stawell	0	0	0	98.36	1.09	0.55	0	0	0	0	97.81	2.19	0	0	0	0	0.55	98.91	0.55	0	0
Swan Hill	0.55	0.55	1.09	97.27	0.55	0	0	0	2.19	1.09	95.63	1.09	0	0	1.64	0.55	1.09	96.72	0	0	0
Temora	0	0	0	95.08	3.28	1.64	0	0	0	0	93.99	6.01	0	0	0	0	0.55	96.72	1.09	1.64	0
Trangie Research Station	0	0	1.09	96.17	2.73	0	0	0	0	1.09	97.27	1.64	0	0	0	0	1.64	96.17	2.19	0	0
Toowoomba	0	0	0	98.36	1.64	0	0	0	0	0	97.27	2.73	0	0	0	0	0	95.63	4.37	0	0
Tamworth	0	0	1.64	98.36	0	0	0	0	0	1.64	97.81	0.55	0	0	0	0	1.64	97.27	1.09	0	0
Warwick	0	0	1.64	97.27	1.09	0	0	0	0	1.64	96.72	1.09	0.55	0	0	0	1.64	95.08	3.28	0	0
Wandering	0	0	0	98.91	0.55	0.55	0	0	0	0	98.36	0.55	0.55	0.55	0	0	0	99.45	0	0	0.55
Wagga Wagga	0	0	0	96.17	3.28	0.55	0	0	0	0.55	95.08	3.83	0.55	0	0	0	1.64	96.72	1.09	0.55	0
Walgett	0	0	4.37	88.52	6.56	0.55	0	0	0	6.01	90.16	3.83	0	0	0	0.55	3.28	93.99	1.09	1.09	0
Wangaratta	0	0	0	96.72	3.28	0	0	0	0	0.55	95.08	3.83	0.55	0	0	0	2.19	96.17	1.09	0.55	0
Woolshed	0	2.73	20.77	69.95	6.56	0	0	0	6.56	12.57	65.57	12.57	2.73	0	0.55	13.11	12.57	65.57	7.65	0.55	0
Warra	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
West Wyalong	0	0	0	96.72	2.73	0.55	0	0	0	0.55	95.63	3.83	0	0	0	0	1.64	96.17	1.64	0.55	0
Minlaton	0	0	0	98.36	1.64	0	0	0	0	0.55	98.91	0.55	0	0	0	0	0	100	0	0	0
Yanco Agricultural Institute	0	0	3.83	96.17	0	0	0	0	0	3.28	96.17	0.55	0	0	0	0	3.83	95.63	0	0.55	0
Yarrowonga	0	0	0.55	95.63	3.28	0.55	0	0	0	0.55	96.72	2.19	0.55	0	0	0	1.64	96.72	1.64	0	0

Site	Error (One-day ahead)							Error (Three-day ahead)							Error (Six-day ahead)						
	-3	-2	-1	0	1	2	3	-3	-2	-1	0	1	2	3	-3	-2	-1	0	1	2	3
Albury	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	99.45	0.55	0	0
Amberley	1.09	1.09	3.83	92.35	1.64	0	0	1.09	3.28	2.19	91.8	1.64	0	0	1.09	2.73	2.73	91.26	2.19	0	0
Armidale	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Applethorpe	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Avalon	0	0	0	99.45	0.55	0	0	0	0	0	98.91	1.09	0	0	0	0	0	100	0	0	0
Ayr DPI	0	0	3.28	61.75	16.94	9.29	8.74	1.09	1.64	3.83	62.84	9.29	10.93	10.4	2.73	4.37	13.11	66.12	6.56	6.01	1.09
Bridgetown	0	0	0	98.91	0.55	0.55	0	0	0	0	99.45	0.55	0	0	0	0	0	99.45	0.55	0	0
Bendigo	0	0	0	99.45	0.55	0	0	0	0	0	98.91	1.09	0	0	0	0	0	100	0	0	0
Cobar	0	0	0	97.81	2.19	0	0	0	0	0	98.36	1.64	0	0	0	0	0	96.72	3.28	0	0
Condobolin	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0	0	0	0	99.45	0.55	0	0
Cessnock	0	0	0.55	99.45	0	0	0	0	0	0.55	99.45	0	0	0	0	0	0.55	99.45	0	0	0
Charlton	0	0	0	99.45	0.55	0	0	0	0	0	98.36	1.64	0	0	0	0	0.55	98.91	0.55	0	0
Collie East	0	0	0	98.91	1.09	0	0	0	0	0	100	0	0	0	0	0	0	99.45	0.55	0	0
Clare High School	0	0	0	100	0	0	0	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0
Coonamble	0	0	0	98.91	1.09	0	0	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0
Casino	0	0	1.09	98.36	0.55	0	0	0	0	1.09	96.17	2.73	0	0	0	0	1.09	96.17	2.73	0	0
Casterton	0	0	0	100	0	0	0	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0
Cunderdin	0	0	0	98.91	1.09	0	0	0	0	0	98.36	1.64	0	0	0	0	0	100	0	0	0
Cleve	0	0	0	98.91	1.09	0	0	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0
Cowra	0	0	0	98.36	1.64	0	0	0	0	0	98.36	1.64	0	0	0	0	0	99.45	0.55	0	0
Dubbo	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Dalby	0	0	0	100	0	0	0	0	0	0	99.45	0.55	0	0	0	0	0	96.72	2.73	0.55	0
Mudgee	0	0	0.55	98.91	0.55	0	0	0	0	0.55	99.45	0	0	0	0	0	0.55	98.91	0.55	0	0
Dunns Hill	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Deniliquin	0	0	0	99.45	0.55	0	0	0	0	0	96.72	3.28	0	0	0	0	0	99.45	0.55	0	0
Dalwallinu	0	0	0	100	0	0	0	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0
Emerald	0	2.73	6.56	90.16	0.55	0	0	0.55	2.19	6.01	89.07	2.19	0	0	0.55	2.19	7.1	89.62	0.55	0	0
Esperance	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Forbes	0	0	0	98.91	1.09	0	0	0	0	0	98.91	1.09	0	0	0	0	0	99.45	0.55	0	0
Gayndah	0	0.55	2.73	96.72	0	0	0	0	0.55	1.64	96.72	1.09	0	0	0	0.55	2.19	95.63	1.64	0	0

Site	Error (One-day ahead)							Error (Three-day ahead)							Error (Six-day ahead)						
Griffith	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Grafton	0	0	1.64	96.72	1.64	0	0	0	0	2.19	94.54	2.73	0.55	0	0	0	1.64	95.63	2.73	0	0
Glen Innes	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
UQ Gatton	0	0	2.19	92.35	5.46	0	0	0	0.55	1.64	91.8	4.92	1.09	0	0	0.55	2.73	90.16	6.56	0	0
Gunnedah	0	0	0	98.36	1.09	0.55	0	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0
Gympie	0	0	6.56	87.98	4.92	0.55	0	0	1.09	6.01	88.52	4.37	0	0	0	1.64	5.46	84.7	7.1	1.09	0
Hamilton	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Hopetoun	0	0	0	97.81	1.64	0.55	0	0	0	0	96.72	3.28	0	0	0	0	0.55	98.91	0.55	0	0
Hay CSIRO	0	0	0.55	99.45	0	0	0	0	0	0.55	99.45	0	0	0	0	0	0.55	99.45	0	0	0
Inglewood Forest	0	0	0.55	99.45	0	0	0	0	0	0.55	97.81	1.09	0.55	0	0	0	0.55	98.91	0	0.55	0
Inverell Research Centre	0	0	0	98.91	1.09	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Keith (Munkora)	0	0	0	98.91	1.09	0	0	0	0	0.55	96.72	1.64	1.09	0	0	0	0	100	0	0	0
Kingscote	0	0	0	100	0	0	0	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0
Kingaroy	0.55	1.64	5.46	91.8	0.55	0	0	0.55	1.64	5.46	91.26	1.09	0	0	0.55	1.64	5.46	91.8	0.55	0	0
Katanning	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Longerenong	0	0	0	98.91	1.09	0	0	0	0	0	98.91	1.09	0	0	0	0	0	100	0	0	0
Lameroo (Austin Plains)	0	0	0	97.81	2.19	0	0	0	0	0	97.27	2.19	0.55	0	0	0	0	99.45	0.55	0	0
Mount Ginini	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Miles Constance Street	0	0	0.55	97.81	0.55	1.09	0	0	0	0.55	96.72	1.64	1.09	0	0	0	1.09	96.72	1.64	0.55	0
Minnipa DPI	0	0	0	100	0	0	0	0	0	0	97.81	2.19	0	0	0	0	0	100	0	0	0
Mareeba	0	7.65	19.13	72.13	1.09	0	0	0.55	6.01	16.94	72.68	3.83	0	0	0.55	8.2	19.13	70.49	1.09	0.55	0
Moree	0	0	0.55	99.45	0	0	0	0	0	0.55	99.45	0	0	0	0	0	0.55	99.45	0	0	0
Morawa	0	0	0	98.36	1.64	0	0	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0
Narrabri	0	0	0	98.36	1.09	0.55	0	0	0	0	100	0	0	0	0	0	0	99.45	0.55	0	0
Newdegate Research Station	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Young	0	0	0	98.91	1.09	0	0	0	0	0	99.45	0.55	0	0	0	0	0	99.45	0.55	0	0
Nhill	0	0	0	98.91	1.09	0	0	0	0	0	97.81	1.64	0.55	0	0	0	0	99.45	0.55	0	0
Scone	0	0	0.55	97.27	1.64	0.55	0	0	0	0.55	96.72	2.73	0	0	0	0	0.55	94.54	3.83	0.55	0.55
Orange	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Oakey	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Parafield	0	0	0.55	99.45	0	0	0	0	0	0.55	97.81	1.64	0	0	0	0	0	100	0	0	0
Parkes	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0

Table D1: AHLU prediction error for a HLI cut-off of 86																					
Site	Error (One-day ahead)							Error (Three-day ahead)							Error (Six-day ahead)						
Parafield	0	0	1.09	98.36	0.55	0	0	0	0.55	0.55	96.72	2.19	0	0	0	0	1.09	98.91	0	0	0
Parkes	0	0	0.55	97.81	1.64	0	0	0	0	0	99.45	0.55	0	0	0	0	0.55	97.81	1.64	0	0
Padthaway South	0	0	0	97.81	2.19	0	0	0	0	0.55	96.17	2.73	0.55	0	0	0	0.55	98.91	0.55	0	0
Port Augusta	0	0	1.09	98.36	0.55	0	0	0	0.55	1.09	96.72	1.64	0	0	0	0.55	3.28	95.63	0.55	0	0
Rocky Gully	0	0	0	100	0	0	0	0	0	0	99.45	0.55	0	0	0	0	0	99.45	0.55	0	0
Roma	0	0	0.55	97.81	1.64	0	0	0	0	1.64	96.72	1.09	0.55	0	0	0	1.64	96.17	2.19	0	0
Rockhampton	0	2.19	12.57	70.49	13.11	1.09	0.55	0.55	1.09	13.11	69.4	9.84	4.37	1.64	2.73	4.92	13.11	68.31	5.46	4.92	0.55
St. George	7.1	7.65	3.28	68.85	8.74	3.28	1.09	8.74	6.56	3.28	54.1	14.21	9.29	3.83	8.74	6.56	4.92	51.37	16.94	9.29	2.19
Shepparton	0	0	0	99.45	0.55	0	0	0	0	0.55	99.45	0	0	0	0	0	2.19	97.81	0	0	0
Strathalbyn Racecourse	0	0	0	98.91	1.09	0	0	0	0	0.55	98.91	0.55	0	0	0	0	0	99.45	0.55	0	0
St. Lawrence	5.46	10.38	25.68	52.46	3.28	1.64	1.09	4.37	9.29	15.3	59.56	4.92	2.73	3.83	12.57	11.48	20.22	50.82	2.73	1.64	0.55
Salmon Gums Research Station	0	0	0.55	99.45	0	0	0	0	0	0	97.81	2.19	0	0	0	0	0.55	98.91	0.55	0	0
Snowtown (Rayville Park)	0	0	1.09	98.36	0.55	0	0	0	0	1.09	97.27	1.64	0	0	0	0	1.09	98.91	0	0	0
Southern Cross	0	0	0	98.91	1.09	0	0	0	0	1.09	95.63	2.73	0.55	0	0	0	1.09	98.91	0	0	0
Stawell	0	0	0	98.36	1.09	0.55	0	0	0	0	97.81	2.19	0	0	0	0	0.55	98.91	0.55	0	0
Swan Hill	0.55	0.55	1.09	97.27	0.55	0	0	0	2.19	1.09	95.63	1.09	0	0	1.64	0.55	1.09	96.72	0	0	0
Temora	0	0	0	95.08	3.28	1.64	0	0	0	0	93.99	6.01	0	0	0	0	0.55	96.72	1.09	1.64	0
Trangie Research Station	0	0	1.09	96.17	2.73	0	0	0	0	1.09	97.27	1.64	0	0	0	0	1.64	96.17	2.19	0	0
Toowoomba	0	0	0	98.36	1.64	0	0	0	0	0	97.27	2.73	0	0	0	0	0	95.63	4.37	0	0
Tamworth	0	0	1.64	98.36	0	0	0	0	0	1.64	97.81	0.55	0	0	0	0	1.64	97.27	1.09	0	0
Warwick	0	0	1.64	97.27	1.09	0	0	0	0	1.64	96.72	1.09	0.55	0	0	0	1.64	95.08	3.28	0	0
Wandering	0	0	0	98.91	0.55	0.55	0	0	0	0	98.36	0.55	0.55	0.55	0	0	0	99.45	0	0	0.55
Wagga Wagga	0	0	0	96.17	3.28	0.55	0	0	0	0.55	95.08	3.83	0.55	0	0	0	1.64	96.72	1.09	0.55	0
Walgett	0	0	4.37	88.52	6.56	0.55	0	0	0	6.01	90.16	3.83	0	0	0	0.55	3.28	93.99	1.09	1.09	0
Wangaratta	0	0	0	96.72	3.28	0	0	0	0	0.55	95.08	3.83	0.55	0	0	0	2.19	96.17	1.09	0.55	0
Woolshed	0	2.73	20.77	69.95	6.56	0	0	0	6.56	12.57	65.57	12.57	2.73	0	0.55	13.11	12.57	65.57	7.65	0.55	0
Warra	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
West Wyalong	0	0	0	96.72	2.73	0.55	0	0	0	0.55	95.63	3.83	0	0	0	0	1.64	96.17	1.64	0.55	0
Minlaton	0	0	0	98.36	1.64	0	0	0	0	0.55	98.91	0.55	0	0	0	0	0	100	0	0	0
Yanco Agricultural Institute	0	0	3.83	96.17	0	0	0	0	0	3.28	96.17	0.55	0	0	0	0	3.83	95.63	0	0.55	0

**Table D3: AHLU prediction error for a HLI cut-off of 92**

Site	Error (One-day ahead)							Error (Three-day ahead)							Error (Six-day ahead)						
	-3	-2	-1	0	1	2	3	-3	-2	-1	0	1	2	3	-3	-2	-1	0	1	2	3
Albury	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Amberley	0	1.09	3.28	95.63	0	0	0	0	1.09	3.28	95.63	0	0	0	0	1.09	3.28	95.08	0.55	0	0
Armidale	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Applethorpe	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Avalon	0	0	0	100	0	0	0	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0
Ayr DPI	0	1.09	3.28	72.13	13.66	6.01	3.83	0	0.55	2.73	70.49	12.57	9.84	3.83	0	1.09	5.46	80.87	9.29	2.73	0.55
Bridgetown	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0	0	0	0	99.45	0.55	0	0
Bendigo	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Cobar	0	0	0	100	0	0	0	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0
Condobolin	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Cessnock	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Charlton	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Collie East	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Clare High School	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Coonamble	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Casino	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Casterton	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Cunderdin	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Cleve	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Cowra	0	0	0	100	0	0	0	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0
Dubbo	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Dalby	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	98.91	1.09	0	0
Mudgee	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Dunns Hill	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Deniliquin	0	0	0	100	0	0	0	0	0	0	98.91	1.09	0	0	0	0	0	100	0	0	0
Dalwallinu	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Emerald	0	0.55	1.64	97.81	0	0	0	0	0.55	1.64	97.27	0.55	0	0	0	0.55	1.64	97.81	0	0	0
Esperance	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0



Site	Error (One-day ahead)							Error (Three-day ahead)							Error (Six-day ahead)						
Forbes	0	0	0	100	0	0	0	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0
Gayndah	0	0	0.55	99.45	0	0	0	0	0	0.55	99.45	0	0	0	0	0	0.55	99.45	0	0	0
Griffith	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Grafton	0	0	0	99.45	0.55	0	0	0	0	0.55	98.91	0.55	0	0	0	0	0.55	99.45	0	0	0
Glen Innes	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
UQ Gatton	0	0	0.55	98.36	1.09	0	0	0	0	0.55	96.17	2.73	0.55	0	0	0	0.55	98.91	0.55	0	0
Gunnedah	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Gympie	0	0	3.83	95.08	1.09	0	0	0	0	3.83	95.63	0.55	0	0	0	0	3.28	93.44	3.28	0	0
Hamilton	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Hopetoun	0	0	0	98.91	1.09	0	0	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0
Hay CSIRO	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Inglewood Forest	0	0	0	100	0	0	0	0	0	0	99.45	0.55	0	0	0	0	0	99.45	0.55	0	0
Inverell Research Centre	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Keith (Munkora)	0	0	0	100	0	0	0	0	0	0	98.91	1.09	0	0	0	0	0	100	0	0	0
Kingscote	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Kingaroy	0	1.09	1.64	97.27	0	0	0	0	1.09	1.64	97.27	0	0	0	0	1.09	1.64	97.27	0	0	0
Katanning	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Longerenong	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Lameroo (Austin Plains)	0	0	0	100	0	0	0	0	0	0	98.36	1.64	0	0	0	0	0	100	0	0	0
Mount Ginini	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Miles Constance Street	0	0	0	98.91	1.09	0	0	0	0	0	100	0	0	0	0	0	0	98.91	1.09	0	0
Minnipa DPI	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Mareeba	0	0.55	11.48	87.98	0	0	0	0	0.55	11.48	87.43	0.55	0	0	0	0.55	11.48	86.89	1.09	0	0
Moree	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Morawa	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Narrabri	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Newdegate Research Station	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Young	0	0	0	100	0	0	0	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0
Nhill	0	0	0	100	0	0	0	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0
Scone	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0	0	0	0	98.91	0.55	0.55	0
Orange	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Oakey	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0

Site	Error (One-day ahead)							Error (Three-day ahead)							Error (Six-day ahead)						
Parafield	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Parkes	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Padthaway South	0	0	0	100	0	0	0	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0
Port Augusta	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Rocky Gully	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Roma	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Rockhampton	0	0.55	1.64	92.9	4.92	0	0	0	0.55	1.64	89.07	8.2	0.55	0	0	0.55	2.73	91.8	4.37	0.55	0
St. George	8.2	4.37	2.73	83.06	1.64	0	0	8.74	4.92	1.64	76.5	8.2	0	0	8.2	5.46	1.64	75.96	8.2	0.55	0
Shepparton	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Strathalbyn Racecourse	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
St. Lawrence	0	3.28	8.2	87.43	1.09	0	0	0	2.19	9.29	85.25	3.28	0	0	0	3.83	7.65	87.98	0.55	0	0
Salmon Gums Research Station	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Snowtown (Rayville Park)	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Southern Cross	0	0	0	99.45	0.55	0	0	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0
Stawell	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Swan Hill	0	0	1.09	98.91	0	0	0	0	0.55	1.09	98.36	0	0	0	0	0.55	1.09	98.36	0	0	0
Temora	0	0	0	100	0	0	0	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0
Trangie Research Station	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Toowoomba	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Tamworth	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Warwick	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Wandering	0	0	0	100	0	0	0	0	0	0	99.45	0.55	0	0	0	0	0	99.45	0.55	0	0
Wagga Wagga	0	0	0	100	0	0	0	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0
Walgett	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Wangaratta	0	0	0	98.91	1.09	0	0	0	0	0	100	0	0	0	0	0	0	99.45	0.55	0	0
Woolshed	0	0	1.09	97.81	1.09	0	0	0	0	1.64	94.54	3.28	0.55	0	0	0	1.09	95.63	3.28	0	0
Warra	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
West Wyalong	0	0	0	100	0	0	0	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0
Minlaton	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Yanco Agricultural Institute	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Yarrowonga	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0

**Table D4: AHLU prediction error for a HLI cut-off of 95**

Site	Error (One-day ahead)							Error (Three-day ahead)							Error (Six-day ahead)						
	-3	-2	-1	0	1	2	3	-3	-2	-1	0	1	2	3	-3	-2	-1	0	1	2	3
Albury	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Amberley	0	0	2.19	97.81	0	0	0	0	0	2.19	97.81	0	0	0	0	0	2.19	97.81	0	0	0
Armidale	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Applethorpe	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Avalon	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Ayr DPI	0	0	1.64	89.62	8.74	0	0	0	0	0.55	90.16	9.29	0	0	0	0	0.55	93.44	3.83	2.19	0
Bridgetown	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Bendigo	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Cobar	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Condobolin	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Cessnock	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Charlton	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Collie East	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Clare High School	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Coonamble	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Casino	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Casterton	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Cunderdin	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Cleve	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Cowra	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Dubbo	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Dalby	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Mudgee	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Dunns Hill	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Deniliquin	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Dalwallinu	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Emerald	0	0	0.55	99.45	0	0	0	0	0	0.55	99.45	0	0	0	0	0	0.55	99.45	0	0	0
Esperance	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Forbes	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0

Site	Error (One-day ahead)							Error (Three-day ahead)							Error (Six-day ahead)						
Gayndah	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Griffith	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Grafton	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Glen Innes	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
UQ Gatton	0	0	0	100	0	0	0	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0
Gunnedah	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Gympie	0	0	0.55	99.45	0	0	0	0	0	0.55	99.45	0	0	0	0	0	0.55	99.45	0	0	0
Hamilton	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Hopetoun	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Hay CSIRO	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Inglewood Forest	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	99.45	0.55	0	0
Inverell Research Centre	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Keith (Munkora)	0	0	0	100	0	0	0	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0
Kingscote	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Kingaroy	0	0.55	0.55	98.91	0	0	0	0	0.55	0.55	98.91	0	0	0	0	0.55	0.55	98.91	0	0	0
Katanning	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Longerenong	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Lameroo (Austin Plains)	0	0	0	100	0	0	0	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0
Mount Ginini	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Miles Constance Street	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Minnipa DPI	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Mareeba	0	0	0.55	99.45	0	0	0	0	0	0.55	99.45	0	0	0	0	0	0.55	99.45	0	0	0
Moree	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Morawa	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Narrabri	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Newdegate Research Station	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Young	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Nhill	0	0	0	100	0	0	0	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0
Scone	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	98.91	1.09	0	0
Orange	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0
Oakey	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0

Site	Error (One-day ahead)							Error (Three-day ahead)							Error (Six-day ahead)							
Parafield	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0	
Parkes	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0	
Padthaway South	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0	
Port Augusta	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0	
Rocky Gully	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0	
Roma	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0	
Rockhampton	0	0	0.55	97.81	1.64	0	0	0	0	0	0.55	98.36	1.09	0	0	0	0	0.55	97.81	1.64	0	0
St. George	4.37	6.01	1.64	87.98	0	0	0	5.46	5.46	1.09	85.79	2.19	0	0	5.46	5.46	1.09	85.25	2.73	0	0	
Shepparton	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0	
Strathalbyn Racecourse	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0	
St. Lawrence	0	0	4.92	95.08	0	0	0	0	0	4.92	94.54	0.55	0	0	0	0	4.92	95.08	0	0	0	
Salmon Gums Research Station	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0	
Snowtown (Rayville Park)	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0	
Southern Cross	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0	
Stawell	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0	
Swan Hill	0	0	0.55	99.45	0	0	0	0	0	0.55	99.45	0	0	0	0	0	0.55	99.45	0	0	0	
Temora	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0	
Trangie Research Station	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0	
Toowoomba	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0	
Tamworth	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0	
Warwick	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0	
Wandering	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	99.45	0.55	0	0	
Wagga Wagga	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0	
Walgett	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0	
Wangaratta	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0	
Woolshed	0	0	0	99.45	0.55	0	0	0	0	0	99.45	0.55	0	0	0	0	0	100	0	0	0	
Warra	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0	
West Wyalong	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0	
Minlaton	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0	
Yanco Agricultural Institute	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0	
Yarrowonga	0	0	0	100	0	0	0	0	0	0	100	0	0	0	0	0	0	100	0	0	0	

### 7.5 Appendix E1: Temperature statistics

Site	One day ahead forecasts							Three day ahead forecasts							Slope	Intercept	Pearson	RMSE	IOA	Bias	Count
	Slope	Intercept	Pearson	RMSE	IOA	Bias	Count	Slope	Intercept	Pearson	RMSE	IOA	Bias	Count							
Albury	0.89	1.9	0.93	2.71	0.96	-0.35	8480	0.8	4.32	0.9	3.28	0.94	0.21	8240	0.8	4.08	0.85	3.87	0.92	-0.19	8105
Amberley	1.01	-1.13	0.9	2.52	0.94	-0.86	8321	0.9	1	0.87	2.74	0.92	-1.2	8081	0.87	1.65	0.82	3.29	0.89	-1.36	7946
Armidale	0.95	0.65	0.93	1.96	0.96	-0.17	8480	0.86	4.33	0.9	3.06	0.91	2.07	8240	0.86	4.64	0.85	3.74	0.87	2.39	8105
Applethorpe	0.88	1.73	0.92	2.01	0.95	-0.47	8154	0.96	0.76	0.88	2.53	0.93	0.11	7914	0.92	1.73	0.83	3.07	0.9	0.2	7599
Avalon	0.85	2.54	0.91	2.41	0.95	0.02	8480	0.8	4.27	0.86	3.02	0.92	0.91	8240	0.7	5.83	0.77	3.86	0.87	0.65	7814
Ayr DPI	0.71	7.53	0.7	1.83	0.83	-0.15	8479	0.87	3.55	0.77	1.72	0.87	0.07	8239	0.81	5.16	0.73	1.89	0.85	0.18	7813
Bridgetown	0.86	2.23	0.94	2.16	0.97	-0.17	8479	0.84	2.83	0.91	2.69	0.95	0.07	8239	0.79	3.66	0.84	3.62	0.91	0.01	7813
Bendigo	0.9	1.79	0.94	2.55	0.97	-0.09	8480	0.84	3.69	0.92	2.97	0.95	0.6	8240	0.78	4.43	0.86	3.79	0.92	0.25	7814
Cobar	0.98	-0.04	0.94	2.42	0.97	-0.56	8160	0.93	2.18	0.92	2.79	0.96	0.36	7968	0.9	2.67	0.85	3.83	0.92	0.32	7563
Condobolin	0.93	0.35	0.93	2.99	0.95	-1.19	8367	0.83	3.35	0.91	3.03	0.95	-0.68	8127	0.81	3.37	0.86	3.84	0.92	-1.16	7701
Cessnock	0.87	1.97	0.85	3.33	0.92	-0.63	8408	0.81	5.28	0.83	3.67	0.9	1.26	8170	0.8	5.42	0.77	4.4	0.86	1.38	8067
Charlton	0.98	-0.38	0.95	2.58	0.97	-0.74	8461	0.91	2.14	0.92	2.96	0.96	0.4	8221	0.87	2.61	0.87	3.79	0.93	-0.07	8086
Collie East	0.87	2.18	0.94	2.23	0.97	-0.25	8479	0.89	1.85	0.87	3.54	0.93	-0.14	8239	0.77	3.89	0.8	4.2	0.89	-0.23	7813
Clare High School	0.8	2.83	0.88	3.56	0.93	-0.91	8446	0.9	2.58	0.92	2.93	0.96	0.72	8206	0.79	3.82	0.84	3.89	0.92	-0.09	8071
Coonamble	0.94	1.02	0.94	2.33	0.97	-0.43	8479	0.88	3.03	0.91	2.65	0.95	0.16	8239	0.89	2.98	0.87	3.32	0.93	0.25	7813
Casino	0.89	1.64	0.9	2.25	0.94	-0.86	8480	0.92	1.45	0.86	2.58	0.92	-0.39	8240	0.88	2.17	0.82	2.96	0.9	-0.46	7814
Casterton	0.89	1.33	0.93	2.4	0.96	-0.43	8418	0.84	2.92	0.91	2.78	0.95	0.38	8178	0.74	4.23	0.81	3.97	0.89	-0.08	7758
Cunderdin	0.94	1.32	0.95	2.25	0.98	-0.07	8419	0.92	2.02	0.94	2.69	0.97	0.3	8179	0.88	2.66	0.88	3.68	0.94	-0.02	7753
Cleve	0.87	2.36	0.93	2.33	0.96	-0.22	8478	0.84	3.66	0.88	3.05	0.94	0.5	8239	0.69	5.75	0.78	4.07	0.87	-0.42	7812
Cowra	0.96	0.45	0.95	2.37	0.97	-0.42	8394	0.89	2.55	0.93	2.7	0.96	0.3	8154	0.88	2.54	0.89	3.44	0.94	0.05	7734
Dubbo	0.92	1.49	0.95	2.25	0.97	-0.36	8287	0.86	3.35	0.92	2.63	0.96	0.25	8047	0.86	3.25	0.88	3.31	0.94	0.23	7630
Dalby	0.88	2.18	0.91	2.4	0.95	-0.47	8448	0.98	0.96	0.9	2.73	0.94	0.49	8208	0.95	1.9	0.85	3.41	0.91	0.68	7813
Mudjee	0.95	0.45	0.95	2.16	0.97	-0.47	8422	0.91	1.56	0.92	2.66	0.96	-0.11	8182	0.92	1.27	0.86	3.53	0.93	-0.22	7756
Dunns Hill	0.93	0.37	0.95	2.05	0.97	-0.6	8408	0.82	2.87	0.9	2.69	0.94	0.22	8168	0.7	4.27	0.77	4.01	0.87	-0.11	7745
Deniliquin	0.98	0.11	0.96	2.22	0.98	-0.32	8479	0.92	2.49	0.93	2.76	0.96	0.7	8239	0.85	3.51	0.88	3.63	0.94	0.36	7813
Dalwallinu	0.92	1.78	0.96	2.15	0.98	0.07	8415	0.92	2.32	0.94	2.62	0.97	0.61	8175	0.87	3.36	0.89	3.5	0.94	0.45	7749
Emerald	0.89	2.66	0.9	2	0.95	-0.06	8449	0.83	3.8	0.88	2.26	0.93	-0.47	8209	0.83	3.87	0.84	2.6	0.91	-0.45	8074

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Site	One day ahead forecasts							Three day ahead forecasts							Slope	Intercept	Pearson	RMSE	IOA	Bias	Count
	Slope	Intercept	Pearson	RMSE	IOA	Bias	Count	Slope	Intercept	Pearson	RMSE	IOA	Bias	Count							
Esperance	0.88	2.29	0.9	2.18	0.95	0.11	8480	0.93	1.95	0.86	2.79	0.92	0.63	8240	0.78	3.98	0.75	3.54	0.86	0.11	7814
Forbes	0.96	0.3	0.93	2.89	0.96	-0.56	8479	0.89	2.8	0.91	3	0.95	0.33	8239	0.88	2.86	0.87	3.74	0.93	0.09	7813
Gayndah	0.92	1.45	0.9	2.25	0.95	-0.58	8479	0.97	0.77	0.86	2.85	0.92	-0.04	8239	0.92	2.03	0.83	3.11	0.91	0.02	7813
Griffith	0.97	0.42	0.95	2.47	0.97	-0.32	8480	0.91	2.14	0.92	2.93	0.96	0.09	8240	0.89	2.4	0.86	3.84	0.93	-0.15	8105
Grafton	0.87	1.95	0.9	2.15	0.94	-0.86	7374	0.9	2	0.87	2.29	0.93	-0.11	7202	0.9	2.06	0.84	2.59	0.91	-0.2	6769
Glen Innes	0.95	0.55	0.93	2.1	0.96	-0.36	8479	0.99	0.08	0.91	2.43	0.95	-0.05	8239	0.96	0.66	0.86	3.02	0.92	-0.04	7813
UQ Gatton	0.93	1	0.9	2.47	0.94	-0.53	8323	1	0.05	0.87	2.94	0.93	0.09	8083	0.97	0.83	0.83	3.45	0.9	0.17	7679
Gunnedah	0.96	0.32	0.94	2.28	0.97	-0.55	8479	0.95	1.13	0.92	2.65	0.96	-0.1	8239	0.94	1.31	0.87	3.42	0.93	-0.1	7813
Gympie	0.95	0.7	0.92	1.98	0.96	-0.48	8477	1	0	0.87	2.75	0.92	0.06	8237	0.93	1.66	0.84	2.95	0.91	0.08	7811
Hamilton	0.91	1.11	0.94	2.38	0.97	-0.33	8466	0.85	2.81	0.91	2.91	0.95	0.44	8226	0.75	4.09	0.81	4.1	0.9	0.05	7800
Hopetoun	0.91	1.87	0.95	2.45	0.97	0.12	8480	0.88	3.01	0.94	2.77	0.97	0.58	8240	0.8	4.13	0.87	3.86	0.93	0.13	7814
Hay CSIRO	1.01	-0.78	0.93	2.99	0.96	-0.55	8477	0.92	1.65	0.92	3.01	0.96	-0.2	8237	0.89	2.08	0.86	3.98	0.93	-0.44	8102
Inglewood Forest	0.55	10.03	0.73	4.56	0.83	-0.02	7809	0.58	10.05	0.67	5.14	0.81	0.62	7569	0.55	10.76	0.62	5.69	0.78	0.74	7320
Inverell Research Centre	0.62	7.41	0.77	4.4	0.86	0	8437	0.57	9	0.74	4.67	0.84	0.62	8197	0.56	9.31	0.7	4.83	0.82	0.58	7774
Keith (Munkora)	0.91	1.49	0.94	2.63	0.97	-0.17	8479	0.88	3.05	0.92	3.14	0.95	0.79	8239	0.78	4.1	0.85	4.15	0.92	0.09	7813
Kingscote	0.85	2.69	0.91	2.52	0.95	0.07	8480	0.87	2.8	0.89	2.86	0.94	0.64	8240	0.73	4.62	0.79	3.67	0.89	-0.05	7814
Kingaroy	0.95	0.48	0.91	2.22	0.95	-0.5	8479	1.02	-0.08	0.88	2.83	0.93	0.34	8239	0.97	1.08	0.83	3.33	0.9	0.48	7813
Katanning	0.85	1.53	0.88	3.25	0.93	-1.13	8416	0.83	3.04	0.89	2.98	0.94	0.03	8176	0.79	3.5	0.82	3.79	0.9	-0.24	8041
Longerenong	0.96	0.57	0.95	2.39	0.98	-0.25	8466	0.89	2.69	0.93	2.83	0.96	0.57	8226	0.81	3.66	0.86	3.98	0.92	0.05	7800
Lameroo (Austin Plains)	0.92	1.49	0.95	2.33	0.98	-0.03	8479	0.89	2.85	0.93	2.83	0.96	0.77	8239	0.79	4.16	0.86	3.91	0.92	0.15	7813
Mount Ginini	0.98	-0.21	0.96	1.76	0.98	-0.4	8480	0.88	1.24	0.92	2.25	0.96	-0.09	8240	0.84	1.55	0.83	3.32	0.91	-0.18	7814
Miles Constance Street	0.9	2.03	0.88	2.73	0.94	-0.55	8435	0.92	3.03	0.9	2.64	0.94	1.06	8195	0.87	4.63	0.86	3.26	0.91	1.36	8091
Minnipa DPI	0.92	1.68	0.94	2.44	0.97	-0.05	8478	0.91	2.44	0.91	3.03	0.95	0.62	8238	0.76	4.71	0.81	4.3	0.9	-0.33	7812
Mareeba	0.89	2.7	0.89	1.64	0.94	0.02	8479	0.92	1.99	0.88	1.77	0.94	0.09	8239	0.91	2.32	0.86	1.94	0.92	0	7813
Moree	0.91	1.76	0.91	2.55	0.95	-0.36	8480	0.9	3.85	0.89	3.02	0.93	1.42	8240	0.88	4.59	0.86	3.65	0.9	1.84	8105
Morawa	0.94	1.63	0.96	2.16	0.98	0.12	8359	0.91	2.31	0.94	2.62	0.97	0.21	8119	0.86	3.45	0.9	3.49	0.95	0.12	7696
Narrabri	0.94	0.81	0.93	2.33	0.96	-0.56	8480	0.91	2.31	0.9	2.62	0.95	0.07	8240	0.88	3.01	0.84	3.41	0.92	0.19	7814
Newdegate Res Stn	0.87	2.3	0.95	2.13	0.97	-0.04	8419	0.89	2.42	0.92	2.73	0.96	0.3	8179	0.81	3.47	0.83	3.87	0.91	-0.14	7753
Young	0.96	0.42	0.94	2.78	0.97	-0.37	8478	0.91	2.15	0.93	2.91	0.96	0.32	8238	0.9	1.92	0.88	3.87	0.94	-0.04	7812
Nhill	0.94	1.04	0.96	2.17	0.98	-0.19	8478	0.88	2.75	0.94	2.73	0.97	0.53	8238	0.79	3.92	0.86	3.9	0.93	-0.05	7812
Scone	0.95	0.67	0.94	2.31	0.97	-0.4	8479	0.89	2.27	0.89	2.97	0.94	-0.06	8239	0.88	2.31	0.82	4.05	0.9	-0.14	7813
Orange	0.93	0.76	0.95	2.05	0.97	-0.38	8468	0.86	2.47	0.92	2.45	0.96	0.13	8228	0.85	2.47	0.86	3.26	0.92	0.04	7802

B.FLT.0352 Online summer heat load forecast service – 2008/2009

Site	One day ahead forecasts							Three day ahead forecasts							Slope	Intercept	Pearson	RMSE	IOA	Bias	Count
	Slope	Intercept	Pearson	RMSE	IOA	Bias	Count	Slope	Intercept	Pearson	RMSE	IOA	Bias	Count							
Oakey	0.95	0.56	0.92	2.21	0.95	-0.65	8276	0.96	1.15	0.91	2.26	0.95	0.27	8036	0.92	2.34	0.87	2.8	0.93	0.49	7901
Parafield	0.89	2.01	0.93	2.58	0.96	-0.33	8480	0.88	3.09	0.92	2.73	0.95	0.58	8240	0.74	5.27	0.81	3.95	0.9	-0.24	7814
Parkes	0.8	4.19	0.87	3.82	0.93	0.11	8454	0.74	6.22	0.83	4.3	0.91	0.82	8217	0.72	6.66	0.79	4.89	0.88	0.8	7794
Padthaway South	0.91	1.25	0.93	2.56	0.97	-0.33	8479	0.87	2.93	0.91	2.95	0.95	0.68	8239	0.77	4.01	0.83	4.04	0.91	-0.03	7813
Port Augusta	0.86	3.28	0.93	2.41	0.96	-0.11	8479	0.82	5.1	0.9	2.93	0.94	0.89	8239	0.7	7.47	0.8	3.97	0.89	0.32	7813
Rocky Gully	0.88	1.81	0.94	1.81	0.97	-0.14	8479	0.87	2.37	0.89	2.47	0.94	0.33	8239	0.81	3.34	0.79	3.51	0.88	0.18	7813
Roma	0.88	2.69	0.9	2.61	0.95	-0.41	7873	0.84	3.92	0.88	2.8	0.94	-0.09	7633	0.8	5.26	0.82	3.46	0.9	0.26	7564
Rockhampton	0.88	2.83	0.89	1.86	0.94	-0.15	8480	0.87	3.44	0.85	2.14	0.92	0.04	8240	0.82	4.62	0.82	2.38	0.9	0.04	7814
St. George	0.74	6.33	0.86	3.01	0.92	-0.25	8420	0.81	5.48	0.86	3.11	0.92	0.52	8193	0.76	7.14	0.79	3.88	0.88	1	7787
Shepparton	0.89	2.54	0.94	2.61	0.97	0.38	8480	0.82	4.35	0.92	3.1	0.95	0.78	8240	0.77	5.08	0.87	3.72	0.93	0.55	7814
Strathalbyn Racecourse	0.85	2.45	0.92	2.45	0.96	-0.27	8412	0.85	3.26	0.89	2.87	0.94	0.5	8172	0.71	5.35	0.78	3.98	0.88	-0.06	7746
St. Lawrence	0.9	2.23	0.84	2.12	0.91	-0.27	8479	0.96	1.1	0.81	2.45	0.89	0.16	8239	0.86	3.83	0.8	2.33	0.89	0.12	7813
Salmon Gums Res Stn	0.85	2.78	0.91	2.7	0.95	-0.03	8261	0.83	3.56	0.88	3.02	0.94	0.35	8021	0.7	5.36	0.78	4.09	0.88	-0.18	7622
Snowtown (Rayville Park)	0.89	2.44	0.94	2.51	0.97	0.11	8232	0.87	3.32	0.93	2.87	0.96	0.78	7992	0.77	4.79	0.86	3.87	0.92	0.16	7591
Southern Cross	0.91	1.94	0.94	2.59	0.97	0.02	8096	0.89	3.01	0.92	2.97	0.96	0.58	7856	0.8	4.7	0.85	4	0.92	0.22	7430
Stawell	0.93	0.68	0.95	2.21	0.97	-0.51	8480	0.87	2.54	0.92	2.71	0.96	0.25	8240	0.78	3.7	0.84	3.83	0.91	-0.26	7814
Swan Hill	0.92	1.82	0.95	2.45	0.97	0.14	8468	0.88	3.25	0.93	2.84	0.96	0.76	8228	0.81	4.4	0.87	3.76	0.93	0.43	7802
Temora	0.98	-0.03	0.94	2.73	0.97	-0.49	8479	0.88	1.91	0.87	3.85	0.93	-0.62	8239	0.82	3.05	0.83	4.45	0.9	-0.79	7813
Trangie Research Station	0.94	1.1	0.94	2.32	0.97	-0.37	8393	0.84	3.98	0.91	2.77	0.95	0.15	8153	0.83	4.04	0.86	3.41	0.93	0.17	7731
Toowoomba	0.86	2.52	0.91	1.82	0.95	-0.37	8449	0.94	1.61	0.86	2.48	0.92	0.46	8209	0.89	2.88	0.79	3.12	0.88	0.6	7814
Tamworth	0.93	1.2	0.94	2.1	0.97	-0.23	8421	0.88	4.94	0.92	3.5	0.92	2.43	8205	0.88	5.33	0.88	4.15	0.89	2.75	8046
Warwick	0.93	0.79	0.92	2.2	0.95	-0.66	8108	0.96	1.17	0.91	2.35	0.95	0.28	7868	0.92	2.05	0.86	2.96	0.92	0.37	7752
Wandering	0.9	1.9	0.94	2.4	0.97	-0.14	8443	0.87	2.42	0.93	2.8	0.96	-0.13	8203	0.84	2.65	0.86	3.91	0.92	-0.44	7779
Wagga Wagga	1	-0.47	0.94	2.57	0.97	-0.55	8480	0.91	2.14	0.93	2.67	0.96	0.23	8240	0.9	2.19	0.88	3.55	0.94	-0.05	7814
Walgett	0.93	1.17	0.94	2.42	0.97	-0.49	8480	0.89	2.96	0.91	2.79	0.95	0.14	8240	0.89	2.83	0.86	3.53	0.93	0.24	7814
Wangaratta	0.89	2.68	0.94	2.69	0.97	0.46	8468	0.8	4.69	0.92	3.23	0.95	0.82	8228	0.79	4.9	0.89	3.72	0.94	0.7	7802
Woolshed	0.9	1.89	0.87	1.52	0.93	-0.32	8381	0.94	1.35	0.84	1.72	0.91	-0.11	8200	0.94	1.28	0.82	1.88	0.9	-0.13	7757
Warra	0.88	0.71	0.92	1.98	0.95	-0.57	8480	0.79	2	0.84	2.6	0.91	-0.17	8240	0.72	2.81	0.75	3.23	0.86	-0.18	7814
West Wyalong	0.95	0.91	0.94	2.42	0.97	-0.15	8479	0.89	3.15	0.93	2.74	0.96	0.59	8239	0.86	3.58	0.87	3.66	0.93	0.49	7813
Minlaton	0.89	1.84	0.93	2.32	0.96	-0.32	8480	0.87	2.98	0.9	2.7	0.95	0.56	8240	0.74	4.9	0.81	3.7	0.89	-0.26	7814
Yanco Agricultural Institute	0.99	-0.04	0.96	2.14	0.98	-0.32	8479	0.93	1.95	0.93	2.63	0.96	0.35	8239	0.9	2.5	0.87	3.57	0.93	0.12	8104
Yarrawonga	0.89	2.76	0.94	2.53	0.97	0.46	8480	0.82	4.56	0.93	2.93	0.96	0.8	8240	0.78	5.21	0.88	3.65	0.93	0.66	7814



## 7.6 Appendix E2: Relative humidity statistics

Site	One day ahead forecasts							Three day ahead forecasts							Six day ahead forecasts						
	Slope	Intercept	Pearson	RMSE	IOA	Bias	Count	Slope	Intercept	Pearson	RMSE	IOA	Bias	Count	Slope	Intercept	Pearson	RMSE	IOA	Bias	Count
Albury	0.78	13.29	0.84	12.09	0.91	3	8480	0.64	19.73	0.8	13.29	0.88	3.07	8240	0.63	20.25	0.75	14.53	0.85	3.11	8105
Amberley	0.84	13.05	0.85	10.92	0.92	1.57	8321	0.74	18.67	0.81	11.88	0.9	0.27	8081	0.68	22.77	0.74	13.79	0.86	0.28	7946
Armidale	0.83	11.13	0.85	11.23	0.92	-1.62	8480	0.74	12.13	0.79	14.65	0.87	-6.7	8240	0.67	16.42	0.7	17.63	0.81	-7.9	8105
Applethorpe	0.78	17.27	0.87	10.66	0.93	0.62	8154	0.81	11.84	0.82	13.4	0.9	-1.99	7914	0.74	17.03	0.74	15.96	0.86	-2	7599
Avalon	0.72	17.66	0.78	12.22	0.88	-0.32	8480	0.62	20.43	0.7	14.68	0.82	-4.39	8240	0.53	25.4	0.61	16.56	0.76	-5	7814
Ayr DPI	0.88	6.72	0.75	8.63	0.85	-2.12	8479	0.76	16.01	0.68	9.46	0.81	-2.05	8239	0.56	29.49	0.52	11.68	0.71	-3.6	7813
Bridgetown	0.82	10.63	0.89	10.95	0.94	-1.66	8479	0.79	12.17	0.86	12.3	0.92	-2.24	8239	0.75	12.89	0.81	14.83	0.89	-4.3	7813
Bendigo	0.82	10.17	0.87	11.92	0.93	1.49	8480	0.72	12.76	0.83	13.11	0.9	-1.09	8240	0.65	15.36	0.75	15.97	0.86	-1.5	7814
Cobar	0.8	9.83	0.86	11.13	0.92	2.19	8160	0.65	11.95	0.79	12.85	0.88	-1.46	7968	0.48	15.48	0.61	17.61	0.76	-4.2	7563
Condobolin	0.73	10.84	0.84	11.84	0.91	-0.33	8367	0.57	14.74	0.76	14.44	0.85	-2.9	8127	0.48	17.15	0.6	18.27	0.76	-4.2	7701
Cessnock	0.8	16.62	0.72	16.91	0.84	3.54	8408	0.78	17.4	0.71	16.81	0.84	3.1	8170	0.72	21.7	0.65	18.64	0.8	3.01	8067
Charlton	0.86	10.75	0.89	11.66	0.93	4.36	8461	0.74	14.05	0.85	12.64	0.91	1.91	8221	0.67	17.54	0.76	15.55	0.87	2.01	8086
Collie East	0.85	9.1	0.89	9.69	0.94	-0.57	8479	0.82	10.97	0.8	13.79	0.89	-0.15	8239	0.71	16.01	0.75	14.78	0.86	-2.3	7813
Clare High School	0.75	18.04	0.8	16.82	0.88	5.73	8446	0.67	19.55	0.84	14.12	0.9	2.88	8206	0.57	25.12	0.74	17.29	0.84	3.55	8071
Coonamble	0.78	11.11	0.84	12.85	0.91	-0.39	8479	0.65	13.1	0.78	15.52	0.86	-4.72	8239	0.52	16.69	0.61	20.97	0.76	-7.8	7813
Casino	0.72	20.62	0.85	9.64	0.91	1.18	8480	0.77	15.93	0.82	10.6	0.9	0.11	8240	0.71	20.54	0.75	12.44	0.87	0.25	7814
Casterton	0.75	17.19	0.83	12.25	0.91	1.21	8418	0.71	17.07	0.78	13.86	0.88	-1.98	8178	0.64	20.77	0.72	15.94	0.84	-2.7	7758
Cunderdin	0.88	5	0.91	9.3	0.95	-1.21	8419	0.83	6.92	0.87	11.04	0.93	-1.47	8179	0.77	8.99	0.81	13.68	0.89	-2.2	7753
Cleve	0.78	14.06	0.85	12.52	0.92	1.82	8479	0.64	17.71	0.74	16.02	0.85	-1.9	8239	0.54	23.77	0.63	18.64	0.79	-1.3	7813
Cowra	0.8	10.24	0.87	11.34	0.93	-0.2	8394	0.71	12.64	0.82	13.45	0.9	-2.33	8154	0.66	13.87	0.75	15.76	0.86	-3.8	7734
Dubbo	0.77	11.26	0.84	12.57	0.91	-0.71	8287	0.69	13.41	0.79	14.63	0.88	-3.13	8047	0.58	16	0.66	19.03	0.79	-6	7630
Dalby	0.81	12.94	0.87	10.74	0.93	1.27	8448	0.85	6.15	0.82	13.25	0.9	-2.89	8208	0.82	8.1	0.77	15.29	0.87	-3.1	7813
Mudgee	0.84	11.08	0.88	10.84	0.94	0.62	8422	0.79	11.64	0.83	13.16	0.91	-1.74	8182	0.73	13.95	0.74	16.69	0.85	-3.3	7756
Dunns Hill	0.72	22.23	0.81	13.98	0.89	2.75	8408	0.57	28.2	0.71	16.22	0.83	-1.82	8168	0.44	36.98	0.56	19.94	0.74	-1.9	7745
Deniliquin	0.85	7.74	0.88	11.57	0.94	1.58	8479	0.73	11.08	0.86	12.39	0.92	-0.27	8239	0.58	16.77	0.69	17.37	0.82	-1	7813
Dalwallinu	0.85	5.71	0.89	12.2	0.94	-1.39	8415	0.8	7.25	0.86	13.57	0.92	-2.08	8175	0.72	10.32	0.77	17.6	0.87	-3	7749
Emerald	0.7	13.7	0.87	13.2	0.91	-5.51	8450	0.61	19.22	0.8	15.75	0.86	-6	8210	0.56	21.99	0.72	17.72	0.82	-6.4	7961

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Site	One day ahead forecasts							Three day ahead forecasts						Six day ahead forecasts							
	Slope	Intercept	Pearson	RMSE	IOA	Bias	Count	Slope	Intercept	Pearson	RMSE	IOA	Bias	Count	Slope	Intercept	Pearson	RMSE	IOA	Bias	Count
Esperance	0.84	8.64	0.78	12.35	0.88	-2.95	8480	0.8	10.19	0.73	14.02	0.84	-4.17	8240	0.6	23.94	0.57	17.5	0.74	-5.1	7814
Forbes	0.73	13.19	0.82	14.18	0.9	0.51	8479	0.62	15.56	0.76	16.26	0.86	-1.95	8239	0.56	16.45	0.68	18.66	0.81	-3.6	7813
Gayndah	0.78	14.44	0.86	10.42	0.92	1.13	8479	0.8	10.82	0.8	13.12	0.89	-1.15	8239	0.78	11.87	0.76	14.49	0.87	-1.4	7813
Griffith	0.79	9.8	0.85	11.9	0.92	1.04	8480	0.61	16.9	0.78	14.08	0.87	0.94	8240	0.55	18.55	0.68	16.45	0.81	0.18	8105
Grafton	0.72	20.6	0.83	8.96	0.91	0.47	7374	0.8	13.8	0.82	9.41	0.91	-0.7	7202	0.73	18.62	0.74	11.61	0.86	-0.8	6769
Glen Innes	0.88	9.89	0.89	9.65	0.94	1.32	8479	0.91	4.2	0.84	12.38	0.91	-2.35	8239	0.81	11.58	0.75	15.36	0.86	-2.4	7813
UQ Gatton	0.77	15.31	0.85	10.43	0.92	-0.19	8325	0.79	11.41	0.79	13.06	0.89	-2.75	8085	0.75	13.78	0.74	14.88	0.86	-3	7681
Gunnedah	0.79	10.85	0.86	10.99	0.93	-0.75	8479	0.77	7.61	0.82	13.78	0.89	-5.26	8239	0.68	11.39	0.71	17.52	0.82	-6.4	7813
Gympie	0.79	16.21	0.85	10.18	0.92	1.13	8477	0.87	7.59	0.83	11.55	0.91	-1.66	8237	0.81	11.08	0.79	12.97	0.88	-2.1	7811
Hamilton	0.79	16.19	0.84	13.42	0.91	2.51	8466	0.73	16.21	0.78	15.61	0.88	-1.14	8226	0.65	20.6	0.71	18.06	0.84	-1.7	7800
Hopetoun	0.89	6.4	0.9	10.65	0.95	1.25	8480	0.81	9.29	0.86	12.24	0.92	0.7	8240	0.69	14.31	0.74	16.08	0.86	0.3	7814
Hay CSIRO	0.85	7.75	0.83	12.53	0.91	1.67	8479	0.66	14.93	0.78	13.46	0.87	1.43	8239	0.6	16.65	0.68	15.96	0.82	0.73	8104
Inglewood Forest	0.7	18.1	0.79	15.4	0.89	0.87	7809	0.72	13.8	0.72	18.76	0.85	-2.45	7569	0.66	17.87	0.64	22	0.8	-1.7	7320
Inverell Research Centre	0.73	17.07	0.79	14.1	0.89	0.06	8437	0.71	15.25	0.74	16.08	0.86	-3.35	8197	0.55	25.05	0.57	20.52	0.76	-3.2	7774
Keith (Munkora)	0.81	11.21	0.89	12.07	0.94	0.2	8479	0.73	12.62	0.83	14.76	0.9	-3.11	8239	0.67	15.84	0.77	17.08	0.87	-3.3	7813
Kingscote	0.75	15.4	0.81	11.57	0.9	-0.66	8480	0.73	13.98	0.79	12.83	0.88	-3.35	8240	0.66	18.1	0.75	13.89	0.85	-3.7	7814
Kingaroy	0.75	16.68	0.85	11.37	0.92	-1.71	8479	0.82	7.71	0.81	14.42	0.88	-5.11	8239	0.79	8.77	0.77	16.11	0.86	-5.9	7813
Katanning	0.77	16.43	0.82	13.61	0.9	2.44	8417	0.78	15.35	0.84	12.56	0.91	1.66	8177	0.74	17.69	0.79	14.44	0.89	1.7	8042
Longerenong	0.93	7.22	0.88	12.58	0.93	3.52	8466	0.82	8.86	0.83	14.03	0.91	-0.15	8226	0.75	12.03	0.76	16.7	0.87	-0.2	7800
Lameroo (Austin Plains)	0.87	7.92	0.88	12.22	0.94	1.17	8479	0.77	10.39	0.83	14.21	0.91	-1.37	8239	0.67	14.61	0.76	16.74	0.87	-1.9	7813
Mount Ginini	0.67	22.32	0.81	13.94	0.89	-1.52	8480	0.48	36.36	0.65	18.1	0.79	-1.75	8240	0.34	44.45	0.44	22.74	0.67	-3.4	7814
Miles Constance Street	0.64	20.24	0.78	14.23	0.87	0.47	8435	0.64	15.44	0.77	15.02	0.86	-4.47	8195	0.6	17.8	0.71	16.7	0.83	-4.7	8004
Minnipa DPI	0.86	7.34	0.87	13.29	0.93	0.3	8479	0.78	7.5	0.82	15.67	0.9	-3.83	8239	0.64	15.04	0.69	20.05	0.83	-3.2	7813
Mareeba	0.86	6.64	0.86	10.2	0.91	-4.34	8479	0.86	6.55	0.81	11.61	0.89	-3.95	8239	0.82	8.88	0.77	13.12	0.86	-4.6	7813
Moree	0.73	12.95	0.8	13.77	0.89	-1.27	8480	0.64	13.87	0.77	15.05	0.86	-5.02	8240	0.55	17.27	0.68	17.93	0.8	-6.5	8105
Morawa	0.85	4.83	0.88	11.61	0.94	-1.77	8360	0.83	5.98	0.86	12.47	0.93	-1.21	8120	0.74	8.85	0.77	16.08	0.88	-2.4	7697
Narrabri	0.74	13.62	0.8	12.3	0.89	0.18	8480	0.67	11.5	0.76	14.39	0.85	-5.27	8240	0.55	16.31	0.61	18.35	0.76	-6.3	7814
Newdegate Research Station	0.84	7.67	0.89	10.72	0.94	-1.63	8419	0.84	8.72	0.84	12.95	0.92	-0.94	8179	0.75	12.77	0.76	16.3	0.87	-2.2	7753
Young	0.84	8.6	0.88	11.44	0.94	-0.12	8479	0.79	9.62	0.86	12.49	0.92	-1.69	8239	0.76	10.09	0.8	14.91	0.89	-2.8	7813
Nhill	0.91	7.14	0.9	11.44	0.94	2.9	8478	0.81	9.74	0.84	13.49	0.91	0.28	8238	0.74	12.81	0.78	15.75	0.88	0.11	7812
Scone	0.82	12.4	0.87	12.21	0.93	-0.21	8479	0.78	13.77	0.81	14.94	0.9	-1.54	8239	0.69	18.52	0.7	19.44	0.83	-2.5	7813
Orange	0.79	13.47	0.86	11.31	0.93	-0.39	8468	0.67	18.38	0.77	14.64	0.87	-3.49	8228	0.57	22.99	0.62	19.09	0.78	-5.5	7802

Site	One day ahead forecasts							Three day ahead forecasts							Six day ahead forecasts						
	Slope	Intercept	Pearson	RMSE	IOA	Bias	Count	Slope	Intercept	Pearson	RMSE	IOA	Bias	Count	Slope	Intercept	Pearson	RMSE	IOA	Bias	Count
Oakey	0.83	12.68	0.87	10.43	0.93	1.95	8276	0.84	8.22	0.84	11.82	0.91	-2.19	8036	0.79	11.01	0.79	13.75	0.88	-2.6	7652
Parafield	0.76	12.91	0.8	13.14	0.89	0.93	8480	0.68	13.22	0.77	13.89	0.87	-2.49	8240	0.54	19.97	0.66	16.32	0.8	-2.5	7814
Parkes	0.69	16.55	0.8	16.65	0.89	-0.21	8454	0.6	19.58	0.74	18.78	0.85	-2.07	8217	0.55	19.96	0.66	21.37	0.8	-4.2	7794
Padthaway South	0.76	14.92	0.85	12.62	0.92	0.09	8479	0.69	15.64	0.82	14.37	0.89	-3.56	8239	0.64	18.41	0.76	16.38	0.86	-3.8	7813
Port Augusta	0.83	10.3	0.8	13.79	0.89	3.01	8479	0.72	10.76	0.76	14.18	0.87	-1.28	8239	0.58	16	0.64	17.08	0.8	-1.7	7813
Rocky Gully	0.84	10.42	0.87	9.52	0.93	-1.47	8479	0.8	10.72	0.82	12.01	0.89	-3.72	8239	0.71	15.56	0.72	15.05	0.83	-5.6	7813
Roma	0.76	12.95	0.81	13.05	0.9	0.38	7873	0.59	18.87	0.73	15.32	0.84	-2.21	7633	0.53	21.43	0.65	17.36	0.8	-2.9	7564
Rockhampton	0.71	18.88	0.81	11.14	0.9	-1.04	8480	0.72	17.48	0.78	12.19	0.88	-1.99	8240	0.65	21.12	0.73	13.65	0.85	-2.7	7814
St. George	0.48	29.51	0.61	20.62	0.77	1.55	8420	0.34	35.7	0.44	24.1	0.67	0.73	8193	0.3	36.36	0.4	25.11	0.64	-0.8	7787
Shepparton	0.77	9.1	0.85	12.05	0.92	-2.61	8480	0.69	13.76	0.83	12.77	0.9	-1.99	8240	0.62	16.24	0.73	15.68	0.85	-2.9	7814
Strathalbyn Racecourse	0.76	15.38	0.83	11.96	0.91	1.19	8412	0.67	17.53	0.72	15.35	0.84	-2.08	8172	0.59	21.73	0.66	16.71	0.81	-2.4	7746
St. Lawrence	0.77	15.37	0.76	11.02	0.87	-1.66	8479	0.75	14.62	0.74	11.95	0.85	-3.51	8239	0.65	21.44	0.66	13.45	0.8	-4.2	7813
Salmon Gums Research Station	0.83	8.68	0.84	13.15	0.91	-2.42	8262	0.77	13.63	0.79	14.67	0.89	-1.34	8022	0.6	23.6	0.65	18.91	0.8	-2	7623
Snowtown (Rayville Park)	0.78	10.27	0.87	12.32	0.93	-0.65	8232	0.69	11.42	0.83	14.27	0.89	-4.27	7992	0.61	15.13	0.75	16.74	0.85	-4.6	7591
Southern Cross	0.87	5.09	0.86	12.51	0.93	-0.81	8096	0.74	10.85	0.8	14.51	0.89	-1.11	7856	0.62	15.65	0.71	17.48	0.84	-1.9	7430
Stawell	0.89	10.52	0.87	12.38	0.92	4.54	8480	0.82	10.91	0.8	14.23	0.89	1.75	8240	0.74	15.43	0.72	16.95	0.85	1.77	7814
Swan Hill	0.79	8.29	0.85	12.07	0.92	-0.08	8468	0.74	9.09	0.83	13.1	0.9	-1.44	8228	0.63	13.19	0.7	16.84	0.83	-1.6	7802
Temora	0.82	9.97	0.86	11.96	0.92	1.7	8479	0.71	16.43	0.74	16.52	0.85	2.98	8239	0.61	18.91	0.67	17.7	0.81	0.86	7813
Trangie Research Station	0.78	10.82	0.85	11.95	0.92	-0.15	8398	0.63	16.39	0.77	14.66	0.86	-2.28	8158	0.53	18.57	0.65	18.21	0.79	-4.7	7736
Toowoomba	0.72	21	0.78	13	0.88	1.47	8449	0.79	11.96	0.73	15.68	0.85	-2.62	8209	0.72	16.92	0.63	18.84	0.79	-2.7	7814
Tamworth	0.84	7.65	0.87	10.42	0.93	-1.62	8421	0.73	7.38	0.83	14.32	0.87	-8.23	8205	0.66	10.43	0.75	17.05	0.82	-9.4	8046
Warwick	0.8	16.47	0.88	10.6	0.93	2.49	8108	0.82	11.74	0.84	12.06	0.91	-0.54	7868	0.74	17.19	0.76	14.57	0.87	-0.4	7602
Wandering	0.87	7.32	0.91	10.13	0.95	0.02	8443	0.81	11.23	0.86	12.28	0.93	0.83	8203	0.77	12.5	0.8	14.72	0.9	-0.3	7779
Wagga Wagga	0.85	9.57	0.84	12.92	0.91	3.01	8480	0.74	12.76	0.83	12.74	0.9	1.38	8240	0.67	14.33	0.74	15.18	0.86	0.06	7814
Walgett	0.71	15.83	0.81	14.41	0.89	3.2	8480	0.5	21.53	0.65	17.98	0.79	-0.24	8240	0.33	26.85	0.42	23.16	0.66	-2.3	7814
Wangaratta	0.79	10.02	0.84	13.9	0.91	-0.31	8468	0.74	13.87	0.82	14.39	0.9	1.05	8228	0.68	14.49	0.76	16.66	0.87	-0.9	7802
Woolshed	0.87	9.76	0.86	8.51	0.93	-1.24	8381	0.76	18.58	0.74	11.92	0.86	-1.92	8200	0.68	24.65	0.66	13.76	0.81	-2.3	7757
Warra	0.71	22.8	0.72	10.93	0.85	0.52	8480	0.51	35.55	0.56	13.48	0.74	-2.02	8240	0.44	39.45	0.47	15.04	0.69	-3.2	7814
West Wyalong	0.8	10.06	0.85	12.21	0.92	0.96	8479	0.71	13.3	0.79	14.12	0.88	-0.4	8239	0.6	16.15	0.66	17.82	0.81	-2.3	7813
Minlaton	0.73	17.14	0.81	13.63	0.89	1.52	8480	0.66	16.46	0.77	15.05	0.86	-3.23	8240	0.57	21.52	0.69	17.11	0.82	-3	7814
Yanco Agricultural Institute	0.9	5.71	0.87	10.87	0.93	1.81	8479	0.69	13.28	0.8	12.69	0.89	1.04	8239	0.6	16.1	0.68	15.62	0.82	0.04	8104
Yarrawonga	0.78	7.53	0.84	12.1	0.91	-1.94	8480	0.76	11.75	0.86	11.37	0.92	1.49	8240	0.65	15.21	0.73	14.97	0.85	0.2	7814

## 7.7 Appendix E3: Wind speed statistics

Site	One day ahead forecasts							Three day ahead forecasts							Six day ahead forecasts						
	Slope	Intercept	Pearson	RMSE	IOA	Bias	Count	Slope	Intercept	Pearson	RMSE	IOA	Bias	Count	Slope	Intercept	Pearson	RMSE	IOA	Bias	Count
Albury	0.55	1.56	0.56	2.2	0.74	0.16	8479	0.26	1.44	0.45	2.31	0.62	-0.85	8239	0.21	1.65	0.36	2.41	0.57	-0.77	8104
Amberley	0.85	1.19	0.6	2.94	0.73	0.68	8250	0.52	1.29	0.53	2.4	0.73	-0.35	8010	0.42	1.46	0.47	2.46	0.68	-0.51	7875
Armidale	1.35	1.29	0.61	4.83	0.56	2.96	8480	0.89	2.52	0.53	3.69	0.6	2	8240	0.63	3.57	0.39	3.8	0.53	1.83	8105
Applethorpe	0.41	1.37	0.54	1.26	0.71	-0.3	8154	0.34	1.57	0.47	1.33	0.67	-0.29	7914	0.24	1.76	0.33	1.51	0.58	-0.38	7599
Avalon	0.6	1.37	0.69	2.33	0.8	-0.9	8478	0.39	2.02	0.55	2.86	0.68	-1.44	8238	0.3	2.5	0.43	3.09	0.62	-1.49	7812
Ayr DPI	0.26	1.32	0.52	3.53	0.53	-2.8	8461	0.21	1.56	0.52	3.58	0.52	-2.88	8221	0.14	1.88	0.37	3.74	0.49	-2.95	7796
Bridgetown	0.52	1.12	0.57	1.53	0.74	-0.2	8479	0.37	1.27	0.55	1.51	0.7	-0.38	8239	0.27	1.63	0.39	1.72	0.62	-0.3	7813
Bendigo	0.6	1.46	0.33	3.84	0.47	-0.2	8480	0.38	1.93	0.46	2.21	0.67	-0.64	8240	0.24	2.62	0.31	2.39	0.57	-0.56	7814
Cobar	0.42	1.36	0.54	2.11	0.69	-1	8160	0.33	1.43	0.47	2.35	0.62	-1.33	7968	0.23	1.86	0.33	2.52	0.56	-1.31	7563
Condobolin	0.43	1.51	0.63	2.33	0.72	-1.1	8367	0.35	1.69	0.57	2.54	0.67	-1.32	8127	0.21	2.28	0.34	2.93	0.56	-1.36	7701
Cessnock	0.64	2.44	0.47	3.09	0.62	1.39	8408	0.58	1.63	0.55	2.19	0.73	0.39	8170	0.54	1.73	0.5	2.36	0.69	0.4	8067
Charlton	1.1	2.53	0.68	3.76	0.61	2.9	8461	0.73	2.5	0.58	2.61	0.68	1.44	8221	0.5	3.69	0.43	2.98	0.58	1.75	8086
Collie East	0.48	0.92	0.62	1.27	0.76	-0.2	8479	0.34	1.04	0.56	1.38	0.69	-0.44	8239	0.26	1.33	0.38	1.56	0.61	-0.34	7813
Clare High School	0.75	2.53	0.52	2.94	0.61	1.72	8446	0.64	2.1	0.51	2.33	0.67	0.95	8206	0.49	2.8	0.37	2.75	0.56	1.17	8071
Coonamble	0.45	1.31	0.53	2.19	0.67	-1.2	8472	0.38	1.59	0.47	2.29	0.63	-1.2	8233	0.32	1.91	0.37	2.42	0.59	-1.13	7808
Casino	0.44	0.95	0.61	1.75	0.74	-0.7	8480	0.33	1.11	0.51	1.95	0.66	-0.84	8240	0.33	1.18	0.49	1.99	0.65	-0.8	7814
Casterton	0.63	1.11	0.72	1.6	0.83	-0.5	8418	0.53	1.31	0.62	1.9	0.76	-0.66	8178	0.38	1.95	0.46	2.17	0.67	-0.67	7758
Cunderdin	0.58	1.85	0.45	2.68	0.64	-0.2	8413	0.41	2.19	0.51	2.13	0.69	-0.74	8173	0.25	3.18	0.28	2.54	0.57	-0.52	7747
Cleve	0.53	2.08	0.6	2.27	0.77	-0.4	8471	0.43	2.2	0.55	2.45	0.71	-0.81	8234	0.37	2.85	0.45	2.59	0.67	-0.54	7805
Cowra	0.48	0.79	0.71	1.97	0.76	-1	8394	0.33	1.14	0.59	2.27	0.66	-1.16	8154	0.25	1.44	0.43	2.51	0.6	-1.18	7734
Dubbo	0.58	1.16	0.61	2.09	0.75	-0.9	8287	0.41	1.92	0.49	2.28	0.67	-0.88	8047	0.28	2.57	0.31	2.61	0.58	-0.89	7630
Dalby	0.43	2.04	0.35	3.09	0.55	-0.7	8437	0.44	1.82	0.52	2.31	0.7	-0.89	8197	0.27	2.5	0.36	2.62	0.59	-1.03	7802
Mudgee	0.45	0.87	0.67	1.95	0.74	-1	8416	0.34	1.17	0.59	2.11	0.67	-1.02	8176	0.27	1.43	0.44	2.31	0.61	-1	7750
Dunns Hill	0.65	1.1	0.6	2.06	0.76	-0.6	8408	0.44	1.75	0.43	2.48	0.65	-0.83	8168	0.26	2.54	0.27	2.71	0.55	-0.88	7745
Deniliquin	0.58	1.16	0.64	2.26	0.76	-0.9	8476	0.42	1.4	0.59	2.57	0.68	-1.52	8236	0.25	2.37	0.4	2.79	0.58	-1.39	7810
Dalwallinu	0.54	2.7	0.29	3.68	0.44	0.25	8412	0.33	3.14	0.36	2.21	0.62	-0.43	8172	0.25	3.71	0.26	2.41	0.56	-0.3	7746
Emerald	0.72	3.5	0.52	3.33	0.56	2.42	8448	0.66	2.57	0.49	2.62	0.63	1.26	8208	0.44	3.25	0.33	2.77	0.55	1.09	8073

Site	One day ahead forecasts							Three day ahead forecasts							Six day ahead forecasts						
	Slope	Intercept	Pearson	RMSE	IOA	Bias	Count	Slope	Intercept	Pearson	RMSE	IOA	Bias	Count	Slope	Intercept	Pearson	RMSE	IOA	Bias	Count
Esperance	0.64	1.42	0.64	1.99	0.79	-0.4	8480	0.5	1.76	0.55	2.27	0.72	-0.86	8240	0.38	2.52	0.41	2.5	0.64	-0.73	7814
Forbes	0.51	1.33	0.67	2.03	0.77	-0.9	8471	0.38	1.77	0.52	2.37	0.68	-0.97	8231	0.26	2.28	0.34	2.76	0.58	-1.05	7806
Gayndah	0.47	1.24	0.63	1.82	0.75	-0.6	8475	0.47	1.28	0.64	1.77	0.76	-0.56	8235	0.45	1.4	0.59	1.86	0.74	-0.53	7809
Griffith	0.71	4.41	0.62	3.89	0.62	3.09	8480	0.47	4.09	0.55	2.84	0.67	1.71	8240	0.3	5.04	0.32	3.4	0.53	1.89	8105
Grafton	0.45	0.8	0.61	1.7	0.73	-0.7	7371	0.38	0.87	0.59	1.78	0.68	-0.88	7199	0.36	1.02	0.51	1.85	0.66	-0.82	6766
Glen Innes	0.73	0.63	0.7	1.93	0.82	-0.6	8475	0.59	1.39	0.61	2.11	0.77	-0.49	8235	0.39	2.01	0.42	2.58	0.65	-0.77	7809
UQ Gatton	0.39	1.12	0.55	1.95	0.69	-0.8	8309	0.37	1.17	0.55	1.96	0.68	-0.83	8069	0.36	1.18	0.53	2.01	0.67	-0.88	7665
Gunnedah	0.55	0.9	0.67	1.89	0.78	-0.8	8473	0.38	1.6	0.53	2.1	0.69	-0.78	8234	0.27	1.97	0.37	2.4	0.6	-0.84	7807
Gympie	0.53	0.98	0.68	1.45	0.81	-0.1	8477	0.47	1.05	0.66	1.47	0.79	-0.14	8237	0.38	1.21	0.55	1.66	0.72	-0.21	7811
Hamilton	0.74	1.01	0.7	1.94	0.82	-0.4	8465	0.58	1.38	0.6	2.28	0.75	-0.9	8225	0.39	2.51	0.43	2.58	0.65	-0.86	7799
Hopetoun	0.6	1.5	0.68	2.06	0.8	-0.7	8480	0.55	1.57	0.62	2.36	0.76	-0.92	8240	0.36	2.78	0.43	2.68	0.65	-0.74	7814
Hay CSIRO	0.59	4.21	0.64	3.04	0.7	2.12	8469	0.41	4.25	0.55	2.58	0.69	1.21	8230	0.27	5.11	0.34	3.08	0.57	1.37	8094
Inglewood Forest	0.34	1.81	0.29	1.76	0.52	-0.6	7809	0.28	1.96	0.27	1.69	0.53	-0.71	7569	0.21	2.23	0.19	1.83	0.46	-0.68	7320
Inverell Research Centre	0.29	1.03	0.42	1.82	0.58	-1	8437	0.26	1.12	0.4	1.84	0.56	-1.02	8197	0.24	1.16	0.33	1.96	0.54	-1.05	7774
Keith (Munkora)	0.75	0.91	0.67	2.05	0.81	-0.2	8472	0.65	1.07	0.66	2.02	0.8	-0.52	8232	0.52	1.77	0.52	2.37	0.72	-0.43	7807
Kingscote	0.68	1.47	0.67	2.08	0.81	0	8480	0.5	1.89	0.64	2.02	0.78	-0.42	8240	0.4	2.58	0.49	2.35	0.7	-0.25	7814
Kingaroy	0.52	1.31	0.63	1.47	0.78	-0.2	8477	0.45	1.47	0.57	1.59	0.74	-0.28	8237	0.31	1.8	0.41	1.84	0.63	-0.42	7811
Katanning	0.6	3.82	0.51	2.86	0.62	1.82	8408	0.32	5.81	0.4	3.15	0.53	2.4	8168	0.22	6.57	0.26	3.52	0.47	2.67	8033
Longerenong	0.72	1	0.68	2.04	0.81	-0.5	8461	0.6	1.23	0.62	2.29	0.76	-0.9	8221	0.42	2.35	0.46	2.57	0.67	-0.75	7795
Lameroo (Austin Plains)	0.68	1.25	0.57	2.56	0.73	-0.6	8471	0.56	1.61	0.58	2.41	0.73	-0.96	8232	0.35	2.96	0.37	2.76	0.61	-0.79	7806
Mount Ginini	0.84	-0.09	0.76	1.82	0.83	-1	8477	0.67	0.51	0.61	2.35	0.72	-1.28	8237	0.4	1.95	0.36	2.82	0.59	-1.29	7811
Miles Constance Street	0.75	1.85	0.57	2.02	0.66	1.15	8435	0.61	1.47	0.54	1.6	0.71	0.37	8195	0.45	1.97	0.41	1.76	0.63	0.42	8091
Minnipa DPI	0.55	1.81	0.58	2.02	0.75	-0.6	8473	0.39	2.39	0.44	2.35	0.64	-0.87	8233	0.34	2.79	0.37	2.43	0.61	-0.75	7807
Mareeba	0.37	1.65	0.51	1.78	0.69	-0.2	8479	0.42	1.6	0.56	1.7	0.73	-0.13	8239	0.38	1.62	0.55	1.72	0.71	-0.26	7813
Moree	0.55	3.05	0.39	3.09	0.59	1.02	8468	0.45	2.76	0.37	2.73	0.6	0.3	8228	0.34	3.47	0.26	3.07	0.51	0.49	8093
Morawa	0.56	1.98	0.33	3.24	0.49	-0.2	8358	0.41	2.19	0.46	2.05	0.66	-0.74	8118	0.36	2.5	0.39	2.18	0.62	-0.68	7695
Narrabri	0.42	1.64	0.52	2.22	0.69	-0.9	8479	0.26	2.09	0.35	2.53	0.58	-1.09	8239	0.22	2.38	0.28	2.66	0.55	-0.98	7814
Newdegate Res Stn	0.61	2.03	0.49	2.56	0.68	0.05	8418	0.47	2.35	0.49	2.24	0.7	-0.33	8178	0.27	3.64	0.27	2.68	0.57	-0.09	7752
Young	0.53	0.91	0.66	1.85	0.78	-0.7	8474	0.36	1.36	0.53	2.14	0.68	-0.87	8234	0.26	1.74	0.36	2.42	0.59	-0.88	7808
Nhill	0.66	1.47	0.6	2.41	0.76	-0.3	8477	0.53	1.78	0.6	2.28	0.76	-0.64	8237	0.38	2.65	0.46	2.56	0.67	-0.51	7812
Scone	0.49	1.11	0.65	2.15	0.77	-0.7	8476	0.38	1.35	0.52	2.49	0.68	-0.86	8236	0.28	1.54	0.41	2.73	0.62	-1	7810
Orange	0.6	1	0.69	1.88	0.8	-0.7	8468	0.44	1.57	0.55	2.21	0.71	-0.85	8228	0.3	2.2	0.37	2.57	0.61	-0.83	7802

B.FLT.0352 Online summer heat load forecast service – 2008/2009

Site	One day ahead forecasts							Three day ahead forecasts							Six day ahead forecasts						
	Slope	Intercept	Pearson	RMSE	IOA	Bias	Count	Slope	Intercept	Pearson	RMSE	IOA	Bias	Count	Slope	Intercept	Pearson	RMSE	IOA	Bias	Count
Oakey	1.33	1.04	0.67	4.56	0.62	2.74	8275	1.03	0.95	0.59	3.55	0.68	1.11	8035	0.73	2.19	0.47	3.45	0.64	0.81	7882
Parafield	0.38	1.83	0.45	2.61	0.64	-1	8480	0.42	1.72	0.56	2.31	0.71	-0.96	8240	0.34	2.17	0.44	2.51	0.65	-0.87	7814
Parkes	0.48	1.32	0.58	2.28	0.72	-1	8440	0.4	1.48	0.54	2.39	0.68	-1.13	8203	0.28	1.94	0.37	2.72	0.59	-1.21	7780
Padthaway South	0.66	1.2	0.68	1.68	0.82	-0.1	8479	0.57	1.27	0.64	1.8	0.79	-0.38	8239	0.45	1.84	0.5	2.08	0.71	-0.27	7813
Port Augusta	0.52	2.1	0.57	2.61	0.74	-0.8	8471	0.38	2.74	0.46	2.88	0.67	-0.92	8231	0.32	3.35	0.39	2.95	0.63	-0.73	7805
Rocky Gully	0.6	1.31	0.57	1.74	0.74	-0.4	8479	0.54	1.22	0.6	1.68	0.74	-0.73	8239	0.35	2.15	0.37	2.04	0.61	-0.59	7813
Roma	0.85	1.97	0.6	2.62	0.68	1.37	7873	0.66	1.79	0.51	2.28	0.7	0.43	7633	0.52	2.35	0.38	2.62	0.6	0.45	7564
Rockhampton	0.51	1.32	0.48	1.88	0.68	-0.4	8480	0.47	1.38	0.57	1.57	0.73	-0.47	8240	0.4	1.53	0.49	1.72	0.67	-0.61	7814
St. George	0.21	1.82	0.14	3.47	0.37	-1.2	8411	0.18	1.68	0.24	2.63	0.49	-1.48	8184	0.13	1.8	0.19	2.65	0.48	-1.57	7781
Shepparton	0.61	1.27	0.64	2.13	0.79	-0.4	8454	0.45	1.66	0.52	2.44	0.71	-0.76	8214	0.32	2.38	0.39	2.66	0.63	-0.62	7788
Strathalbyn Racecourse	0.69	1.08	0.68	1.92	0.82	-0.4	8409	0.58	1.4	0.61	2.12	0.77	-0.57	8169	0.49	2.05	0.5	2.38	0.71	-0.37	7743
St. Lawrence	0.5	1.41	0.52	1.8	0.71	-0.2	8479	0.48	1.3	0.59	1.6	0.75	-0.37	8239	0.49	1.24	0.57	1.65	0.74	-0.41	7813
Salmon Gums Res Stn	0.54	2.14	0.39	2.82	0.58	0.02	8258	0.44	2.13	0.48	2.07	0.69	-0.49	8018	0.28	2.93	0.31	2.36	0.59	-0.43	7619
Snowtown (Rayville Park)	0.71	1.1	0.66	2.12	0.81	-0.3	8231	0.57	1.52	0.58	2.32	0.75	-0.61	7991	0.47	2.11	0.48	2.55	0.7	-0.5	7590
Southern Cross	0.49	2.33	0.48	2.43	0.68	-0.3	8094	0.31	2.77	0.4	2.44	0.62	-0.82	7854	0.2	3.51	0.25	2.61	0.54	-0.6	7428
Stawell	0.61	1.18	0.43	3.02	0.6	-0.3	8480	0.47	1.46	0.54	2.13	0.72	-0.53	8240	0.35	2	0.44	2.27	0.66	-0.47	7814
Swan Hill	0.57	1.57	0.45	2.98	0.63	-0.4	8468	0.52	1.48	0.62	2.13	0.76	-0.73	8228	0.34	2.53	0.43	2.45	0.65	-0.51	7802
Temora	0.53	0.99	0.7	2.15	0.78	-1.1	8470	0.38	1.32	0.57	2.59	0.67	-1.45	8230	0.25	1.9	0.37	2.93	0.58	-1.46	7804
Trangie Research Station	0.46	1.34	0.59	1.89	0.73	-0.8	8388	0.4	1.59	0.5	2.07	0.68	-0.74	8148	0.28	2.01	0.34	2.37	0.58	-0.8	7727
Toowoomba	0.68	1.53	0.61	2.43	0.77	-0.6	8448	0.63	1.9	0.57	2.51	0.74	-0.5	8208	0.39	3.35	0.37	2.97	0.62	-0.6	7814
Tamworth	0.98	1.64	0.65	3.05	0.7	1.58	8417	0.51	2.25	0.48	2.4	0.69	0.46	8201	0.43	2.52	0.39	2.64	0.62	0.44	8042
Warwick	0.87	1.64	0.66	2.37	0.73	1.22	8108	0.7	1.52	0.58	2.12	0.74	0.55	7868	0.55	1.8	0.5	2.17	0.69	0.39	7839
Wandering	0.41	1.79	0.3	2.53	0.5	-0.3	8441	0.28	1.8	0.46	1.73	0.62	-0.68	8201	0.19	2.25	0.29	1.9	0.54	-0.58	7777
Wagga Wagga	0.49	0.95	0.67	2.08	0.75	-1	8480	0.34	1.03	0.56	2.55	0.64	-1.55	8240	0.25	1.39	0.43	2.7	0.58	-1.53	7814
Walgett	0.48	1.26	0.59	1.84	0.73	-0.8	8480	0.37	1.59	0.48	2.02	0.66	-0.88	8240	0.29	1.95	0.35	2.22	0.59	-0.86	7814
Wangaratta	0.48	1.05	0.68	1.97	0.78	-0.7	8467	0.39	1.15	0.58	2.27	0.7	-0.94	8227	0.3	1.48	0.48	2.45	0.64	-0.94	7801
Woolshed	0.33	1.76	0.35	1.34	0.59	-0.3	8381	0.28	1.8	0.45	1.15	0.62	-0.35	8200	0.19	2.16	0.27	1.28	0.53	-0.27	7757
Warra	0.49	1.29	0.64	1.83	0.76	-0.6	8480	0.46	1.43	0.59	1.95	0.73	-0.59	8240	0.29	1.95	0.4	2.31	0.61	-0.7	7814
West Wyalong	0.54	1.44	0.52	2.55	0.7	-0.6	8474	0.44	1.65	0.59	2.21	0.73	-0.81	8234	0.26	2.48	0.34	2.72	0.58	-0.83	7809
Minlaton	0.67	1.56	0.59	2.4	0.75	-0.5	8476	0.46	2.3	0.48	2.64	0.67	-1.11	8236	0.36	3.25	0.37	2.78	0.61	-0.84	7810
Yanco Agricultural Institute	0.88	3.53	0.67	3.94	0.65	2.98	8477	0.42	3.56	0.45	2.81	0.66	0.92	8237	0.24	4.58	0.26	3.28	0.53	1.12	8102
Yarrowonga	0.56	1.15	0.65	2.17	0.76	-1	8480	0.39	1.34	0.54	2.68	0.65	-1.59	8240	0.24	2.15	0.3	3.08	0.54	-1.54	7814