



Australian Government

Bureau of Meteorology

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SPECIAL CLIMATE STATEMENT 27

An exceptional summer heatwave in greater Sydney and the Hunter Valley.

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*New South Wales Climate Services Centre
Bureau of Meteorology*

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Australia's National Meteorological Service

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Introduction

Between January 30th and February 6th 2011, the Sydney Metropolitan and Hunter regions of NSW experienced an extended hot spell, breaking numerous records. The exceptionally warm conditions were partly due to a blocking high in the northeast Tasman Sea which remained semi-stationary between January 29th and February 6th. This high pressure system directed persistent warm northerly to northwesterly winds across the state. The position of the sub-tropical ridge, combined with the high pressure system in the Tasman, prevented the progression of cool air masses into the state. This was combined with above average¹ humidity associated with above average sea surface temperatures off the east coast of Australia, as well as above average moisture in inland NSW following recent tropical cyclone activity (TC *Anthony* and TC *Yasi*). The above average humidity resulted in warmer than normal¹ nights across much of NSW.

These conditions persisted until a cold front crossed NSW on the 6th, resulting in cool, windy conditions across much of the state. Temperatures dropped 10°C at Sydney Airport between 12:30 and 2pm, with associated wind gusts of up to 83km/hr. This system was also associated with significant rainfall in southwestern parts of NSW and northern Victoria.

An extended period of heat

Maximum temperatures were well above average across NSW between January 30th and February 6th, with the largest anomalies persisting along the central coast (see figure 1). Records for consecutive days above thresholds were set at many locations, with Sydney Observatory Hill recording seven consecutive days above 30°C between the 31st and the 6th with 41.5°C recorded on the 5th (the highest daily maximum temperature recorded during the hot spell at Sydney Observatory Hill). This is the longest hot spell recorded in the city in 152 years of record, beating the previous record by two days (see table 1).

Western parts of the city also experienced record hot spells, with six consecutive days above 38°C in Richmond between January 31st and February 5th, breaking the previous record of five days set in January 1979. Record warm periods were also recorded at several stations in the Hunter Valley, with six consecutive days above 39°C at Cessnock; twice the length of the previous record of three days (see table 1).

Exceptionally warm nights were also experienced during this period. Significantly warm minimum temperature anomalies covered a larger area of NSW compared with maximum temperature anomalies (see figure 1). Sydney Observatory Hill set a new record of five nights above 24°C between 2-6 February, greatly exceeding the previous record of two nights set in January 2009. Western regions were not as strongly affected, with slightly cooler conditions on the 4th; however, Richmond set a new record for minimum temperature hot spells with five consecutive nights above 22°C recorded (see table 2).

¹The standard reference period for calculation of long-term normals is 1961-1990, unless otherwise stated.

Elsewhere in NSW, Moree recorded six consecutive nights above 25°C between 2-7 February compared to a previous record of four nights, while Orange Airport Comparison recorded five consecutive nights above 19°C for the first time on record, with many other stations recording spells of warm nights seen only once or twice before.

Daily temperature records broken

As well as breaking records for the duration of hot days and nights, individual daily records for minimum temperature were also broken during this event. The most widespread record breaking event occurred on February 3rd (see figures 2 and 3), when all-time records were broken at several locations in the Central West Slopes and Illawarra districts (table 3). Minimum temperature records for February were also broken at locations in the Northwest Plains and Central Tablelands (table 4), with additional records broken later during the heat event.

The night of the 5th was exceptionally warm in the Sydney region and along the central coast, with Sydney Observatory Hill recording a minimum temperature of 27.6°C to 9am on the 6th, breaking the previous record by 1°C. Sydney Airport, Williamtown RAAF, and Newcastle Nobbys also recorded their warmest night on record on this day, with February records at Cessnock, Paterson (Tocal) and Jerrys Plains in the Hunter regions.

Several stations recorded several days with temperatures above their previous daily minimum temperature records for February. Most notably Bankstown Airport AWS, broke its 43 year record minimum of 25.0°C on the 2nd (26.0°C), with two other days on the 3rd (25.4°C) and 6th February (25.9°C) recording minimums in excess of the previous record. Newcastle (Nobbys Head) also recorded daily minimum temperatures above its previous warmest February night on record on the 2nd, 3rd, 5th and 6th.

Williamtown RAAF also recorded its warmest February day on record on the 5th with a maximum temperature of 42.9°C (see table 5). In Sydney this was an exceptionally hot day, with 41.5°C recorded at Observatory Hill and 42.2°C at Sydney Airport, which was the 13th warmest day on record for Sydney Observatory Hill and the equal 15th warmest for Sydney Airport.

Heatwave coinciding with high humidity

The warm night time temperatures coincided with high humidity in the metropolitan region, with Sydney Observatory Hill recording 3pm dewpoint temperatures of up to 23.1°C on the 3rd, the 9th highest in the 57 year record. Vapour pressure anomalies (a measure of humidity) were very high across much of NSW during this event, particularly in southern and western regions associated recent tropical cyclone activity from TC *Anthony* and TC *Yasi* (see figure 4). Vapour pressure has been consistently high across eastern Australia over the last 6 months.

Contacts for further information

The following climatologist may be contact for further information about this event:

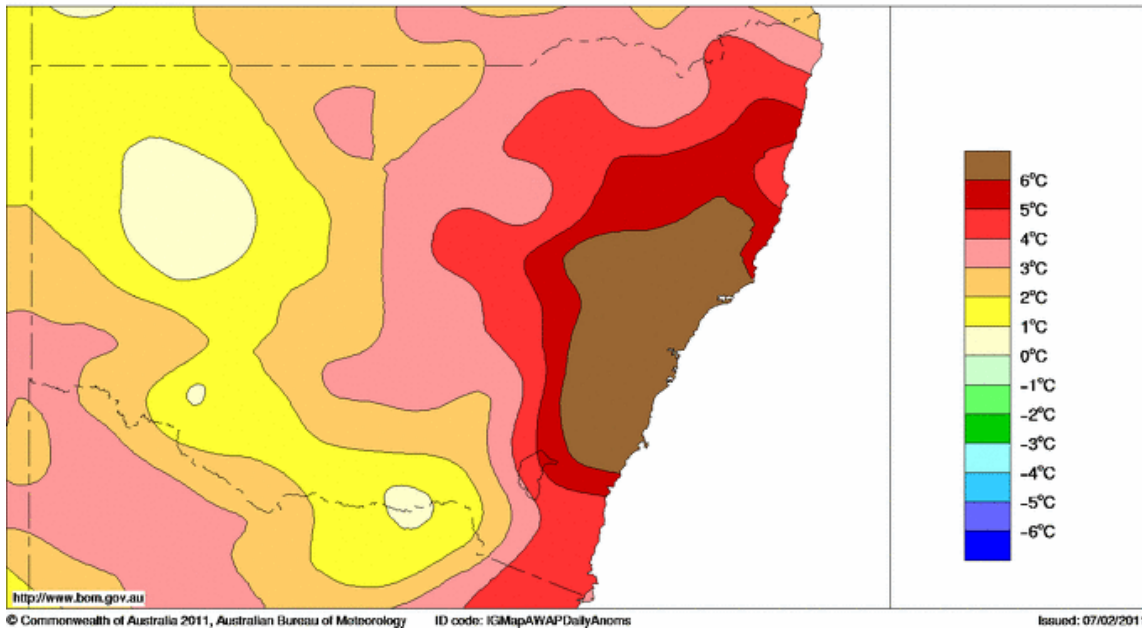
Acacia Pepler or Agata Imielska
NSW Climate Services Centre
(02) 9296 1555

General notes

This statement is based on information as of 7th February 2011. This is preliminary data, and may change as further observations are obtained and quality assurance is undertaken.

Maximum temperatures prior to 1910 have not been considered for inclusion unless they are known to have been measured in a standard Stevenson screen or similar.

AWAP Max. Temp. Anom. (°C) 30/01/2011 to 06/02/2011 (base 61-90)
Product of the National Climate Centre



AWAP Min. Temp. Anom. (°C) 31/01/2011 to 06/02/2011 (base 61-90)
Product of the National Climate Centre

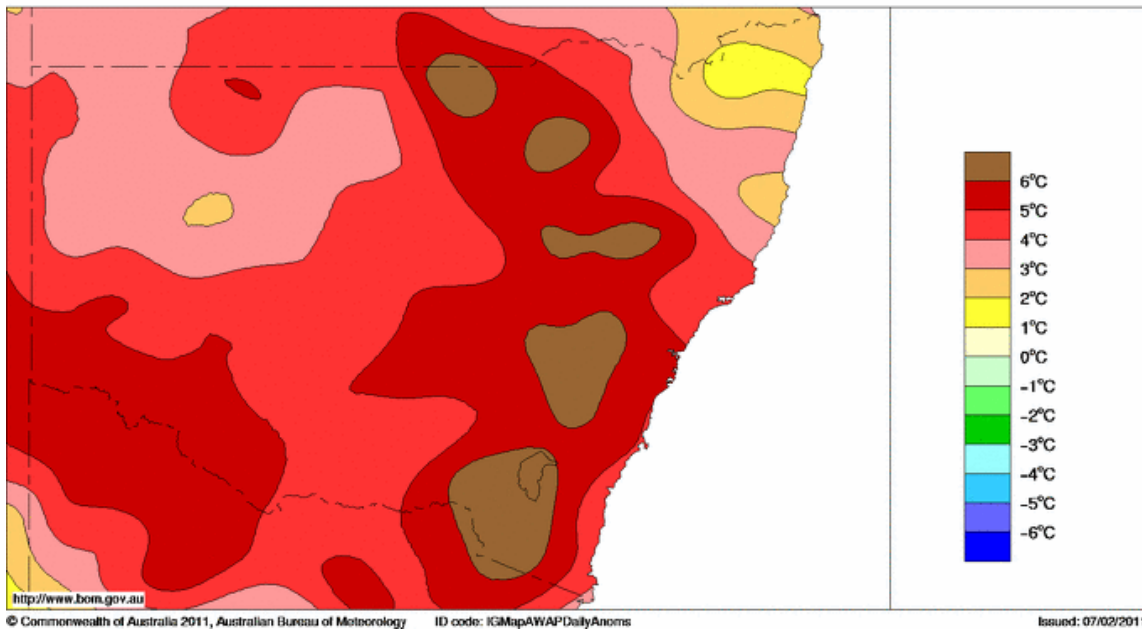


Figure 1. Maximum (above) and minimum (below) temperature anomalies between the January 30th and February 6th 2011, relative to the 1961-1990 average.

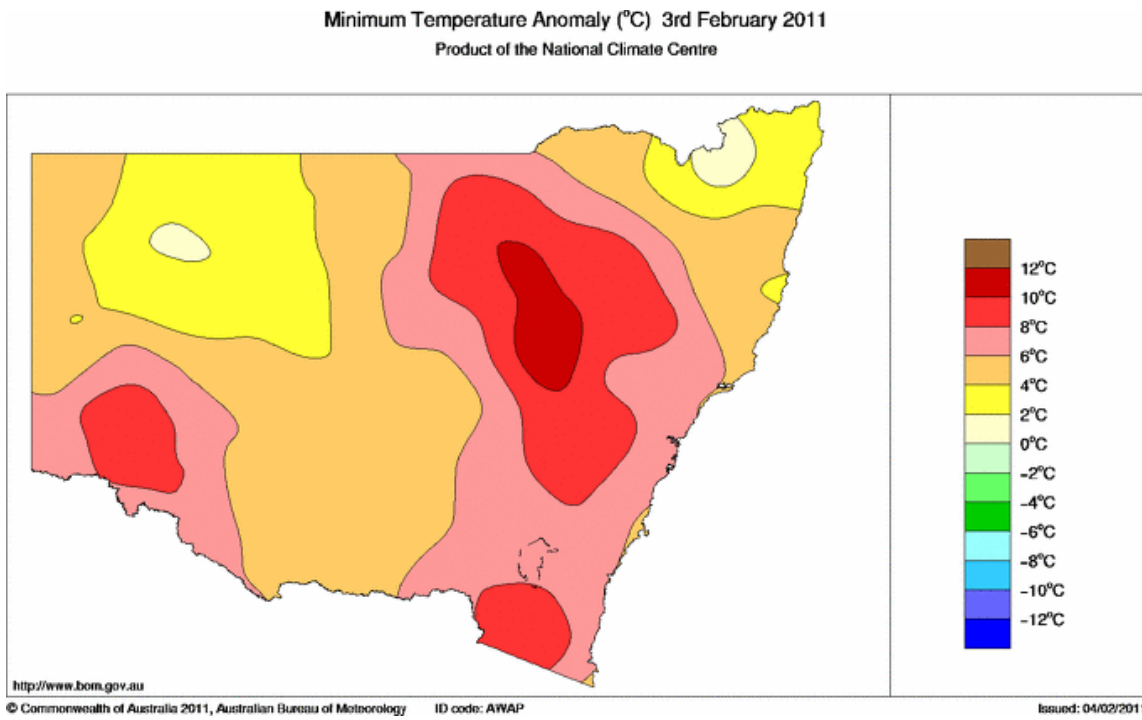


Figure 2. Minimum temperature anomalies for February 3rd relative to the 1971-2000 February average.

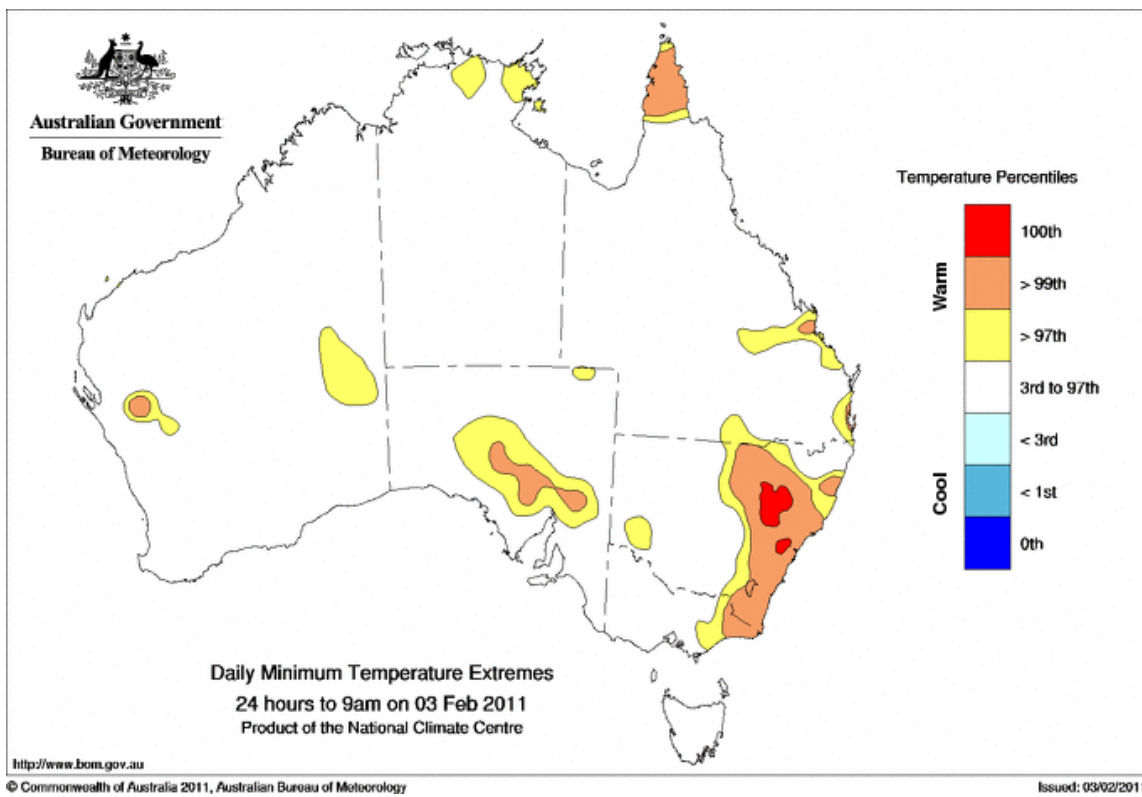
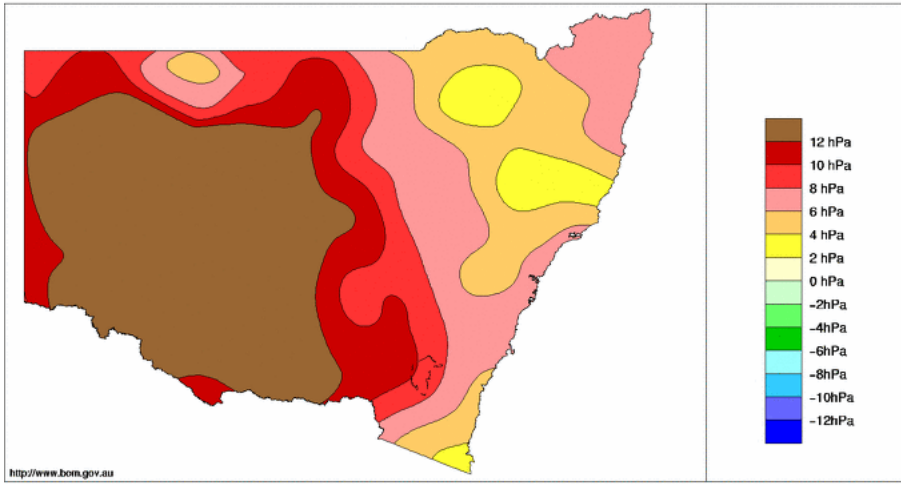
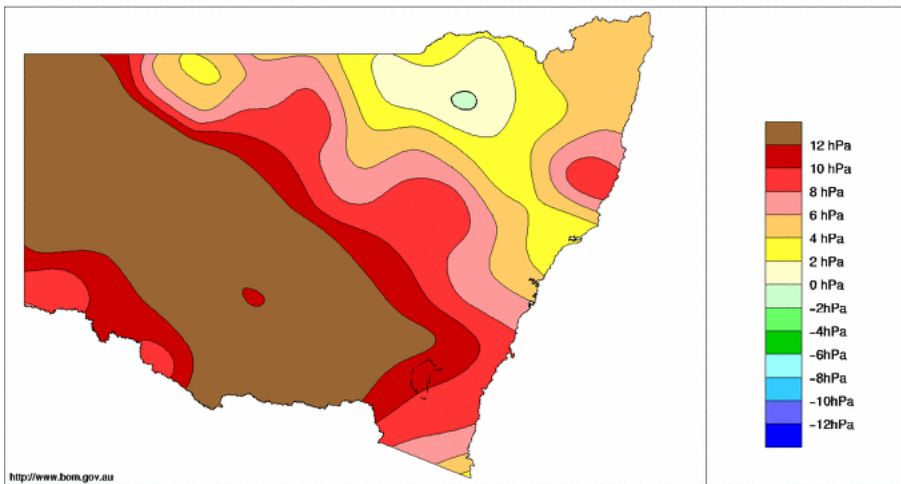


Figure 3. Area of near record (orange) and record high (darkest red) minimum temperatures on February 3rd 2011.

3pm Vapour Pressure Anomaly (hPa) 2nd February 2011
Product of the National Climate Centre



3pm Vapour Pressure Anomaly (hPa) 3rd February 2011
Product of the National Climate Centre



3pm Vapour Pressure Anomaly (hPa) 4th February 2011
Product of the National Climate Centre

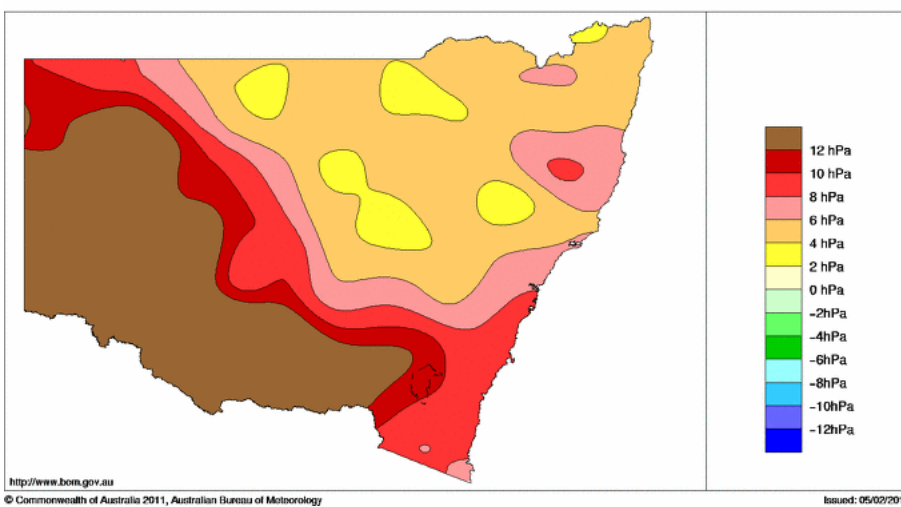


Figure 4. Vapour pressure anomalies (3pm) in NSW (relative to 1971-2000 climatology) on the 2nd (top), 3rd (middle) and 4th (bottom) of February 2011.

Record numbers of consecutive warm days					
Station	Location	Years of record	Threshold	Consecutive Days	Previous record
66062	Observatory Hill	152	30°C	7	5 days (5 occasions, most recent 29 Sept – 3 Oct 1998)
67105/ 67033	Richmond RAAF	72	38°C	6	5 days (6-10 Jan 1979)
61250	Paterson (Tocal)	41	38°C	7	4 days (3 occasions, most recently 5-8 Feb 2009)
61260	Cessnock Airport	40	39°C	6	3 days (4 occasions, most recently 21-23 Jan 2010)
61055	Newcastle Nobbys	55	30°C	6	5 days (2 occasions, most recently 21-25 Dec 1972)

Table 1: Selected major sites with more than 30 years of observations that reported record number of days at or above given daily maximum temperature thresholds for February 2011.

Record numbers of consecutive warm nights					
Station	Location	Years of record	Threshold	Consecutive Nights	Previous record
66062	Observatory Hill	152	24°C	5	2 nights (23-24 Jan 2009)
67105/ 67033	Richmond RAAF	72	22°C	5	4 nights (3-6 Feb 1973)
61250	Paterson (Tocal)	41	23°C	5	3 nights (16-18 Feb 1981)
61260	Cessnock Airport	40	22°C	4	2 nights (5 occasions, most recently 22-23 Jan 2009)
61055	Newcastle Nobbys	55	23°C	5	3 nights (4-6 Feb 1998)
53048/ 53115	Moree Aero	46	25°C	6	4 days (3 occasions, most recently 2-5 Feb 2006)
63231	Orange Airport Comparison	42	19°C	5	3 days (6 occasions, most recently 20-22 Nov 2009)
55049	Quirindi PO	46	23°C	4	3 nights (4 occasions, most recently 21-23 Nov 2009)

Table 2: Selected major sites with more than 30 years of observations that reported record number of days at or above given daily minimum temperature thresholds for February 2011.

Record highest daily minimum temperatures						
Station	Location	Years of record	Min	Date	Previous Record	Date
66137	Bankstown Airport AWS	43	26.0°C	2nd	25.0°C	Dec 8 1990
64009	Dunedoo Post Office	46	28.3°C	3rd	27.5°C	Feb 11 2004
66137	Bankstown Airport AWS	43	25.4°C	3rd	25.0°C	Dec 8 1990
68192	Camden Airport AWS	36	24.0°C	3rd	24.0°C	Dec 23 2000
62021/ 62101	Mudgee Airport Mudgee (George St)	46	25.6°C	3rd	24.7°C	Jan 27 1987
66062	Observatory Hill	152	27.6°C	6th	26.6°C	Feb 6 1973
66037	Sydney Airport AMO	72	26.4°C	6th	25.8°C	Jan 23 2010
61078	Williamstown RAAF	61	26.9°C	6th	25.7°C	Jan 10 1983
61055	Newcastle Nobbys	55	26.0°C	6th	25.5°C	Jan 15 1978
66037	Bankstown Airport AWS	43	25.9°C	6th	25.0°C	Dec 8 1990

Table 3: Sites with more than 30 years of observations that reported record highest daily minimum temperature in 2011 for any month on record.

Record highest February minimum temperatures						
Station	Location	Years of record	Min	Date	Previous Record	Date
66037	Sydney Airport AMO	72	25.1°C	2nd	24.7°C	Feb 23 2010
61055	Newcastle Nobbys	55	25.4°C	2nd	24.0°C	Feb 6 1998
61351	Peats Ridge (Waratah Rd)	30	25.0°C	2nd	24.7°C	Feb 10 1997
67105/ 67033	Richmond RAAF	72	24.9°C	3rd	24.8°C	Feb 2 2006
61055	Newcastle Nobbys	55	24.6°C	3rd	24.0°C	Feb 6 1998
53002	Baradine Forestry	43	28.4°C	3rd	27.5°C	Feb 3 2006
61250	Paterson (Tocal AWS)	41	25.6°C	3rd	25.0°C	Feb 4 1973
62013	Gulgong Post Office	41	27.2°C	3rd	26.5°C	Feb 6 1973
61078	Williamstown Raaf	61	25.6°C	5th	24.5°C	Feb 3 1987
61055	Newcastle Nobbys	55	24.3°C	5th	24.0°C	Feb 6 1998
55049	Qurindi Post Office	46	27.4°C	5th	25.5°C	Feb 3 1973
61086	Jerrys Plains Post Office	55	26.2°C	6th	25.2°C	Feb 3 1987
67019	Prospect Reservoir	47	26.5°C	6th	25.6°C	Feb 10 1997
61250	Paterson (Tocal Aws)	41	26.4°C	6th	25.0°C	Feb 4 1973
61242	Cessnock (Nulkaba)	38	26.3°C	6th	24.2°C	Feb 12 2004

Table 4: Sites with more than 30 years of observations that reported record highest February daily minimum temperature in 2011.

Record highest February maximum temperature						
Station	Location	Years of record	Max	Date	Previous Record	Date
61078	Williamstown RAAF	61	42.9°C	5th	42.8°C	Feb 21 2004

Table 5: Sites with more than 30 years of observations that reported record highest February daily maximum temperature in 2011.

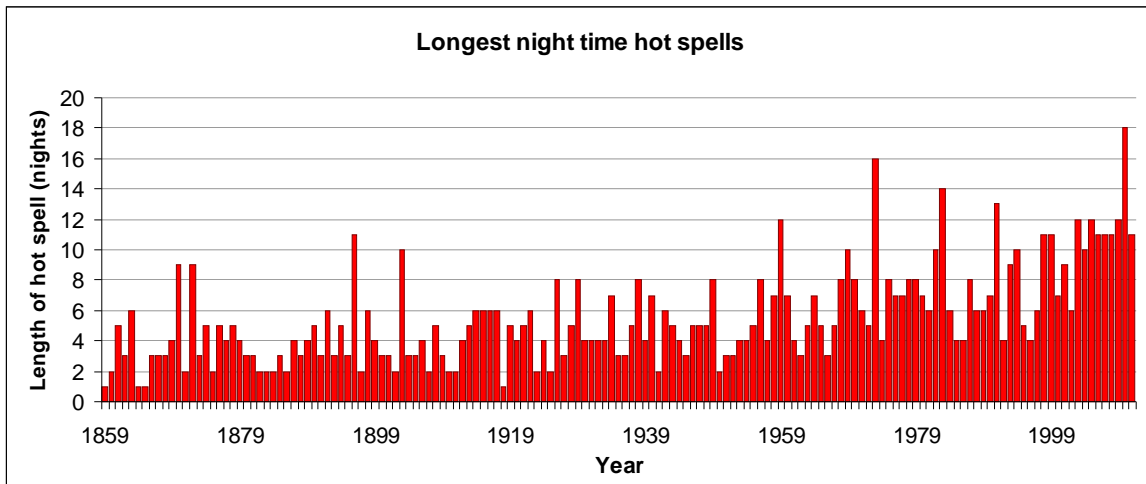


Figure 5: Longest recorded consecutive number of nights at or above 20°C each year for Sydney Observatory Hill, showing an increasing trend in the length of night time hot spells.

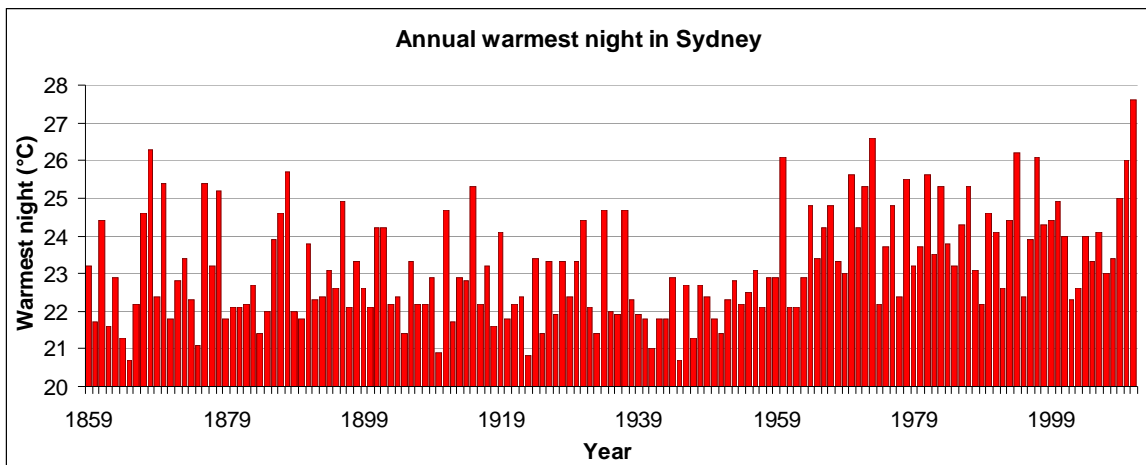


Figure 6: Warmest nights recorded annually at Sydney Observatory Hill showing increasingly warmer nights and a lack of cooler years in the latter half of the century.