

NSW ARBOVIRUS SURVEILLANCE & MOSQUITO MONITORING PROGRAM 2015-2016

Weekly Update

Date: 30/Jan/2016

SUMMARY

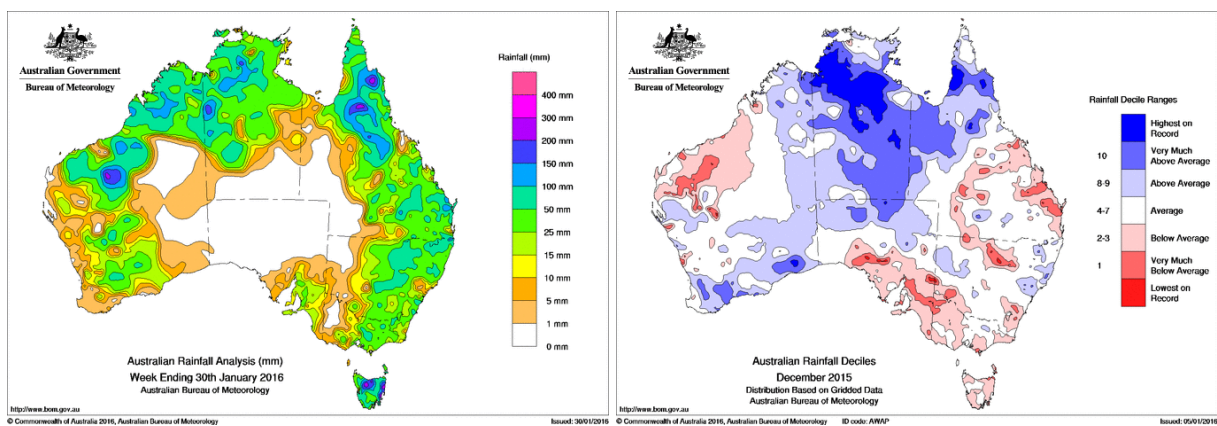
- **Climate:** the last week, most of the state received light to moderate rainfall and was heavier along the coast. For December, rainfall was mostly around average, although there were pockets of the state that had either above or below average rainfall. Maximum and minimum temperatures for December were 1-2 degrees above average, with hotter than normal conditions in the west and south west of the state.
- **Three Month Forecast:** for February to April 2016, rainfall predictions for NSW are for slightly average rainfall for most of state. Maximum and minimum temperatures are expected to be slightly cooler than average. According to the BOM as of 19/Jan/16, the El Niño is persisting but will decline and become neutral by the second quarter of 2016.
- **Tidal:** the next series of high tides are due over 7-12/Feb/2016.
- **MVEV models:** the data relevant to both the Forbes' and Nichols' hypotheses have been updated to December 2015 and both theories remain inconsistent with past MVEV outbreaks.
- **Mosquito Numbers Inland:** Griffith continues with the 'very high' numbers, albeit it just, and there were few other collections this week.
- **Mosquito Numbers Coast:** overall there were few collections this week and numbers were generally 'low', with a 'high' collection from Gosford. Numbers of *Aedes vigilax* continue to remain 'low'.
- **Mosquito Numbers Sydney:** 'high' collections continue at Sydney Olympic Park and Penrith, although 'low' numbers of *Aedes vigilax* were trapped. As per the other areas, fewer collections were made this week.
- **Arboviral Isolates:** there were no arboviral detections in the mosquitoes.
- **Chicken Sentinel Seroconversions:** no further report has been issued.
- **Human Notifications:** for the current fiscal year, there have been 447 RRV and 48 BFV notifications.

Comment: The Australia Day long, long weekend meant that fewer collections were made this week and generally mosquito numbers were down. This season for NSW continues to be relatively quiet on the arboviral front. Notifications are down over January compared with the recent two years, and there have been no isolates detected from the mosquitoes nor any seroconversions in the sentinel chooks.

ENVIRONMENTAL CONDITIONS

Rainfall

Rainfall across Australia for the week ending 30/Jan/2016 is depicted on the left and monthly rainfall deciles for December 2015 are on the right. Over the last week, most of the state received light to moderate rainfall and was heavier along the coast. For December, rainfall was mostly around average, although there were pockets of the state that had either above or below average rainfall. Maximum and minimum temperatures for December were mostly around 1-2 degrees above average, with hotter than normal conditions in the west and south west of the state.



Three Month Rainfall & Temperature Forecast

For February to April 2016, rainfall predictions for NSW are for slightly average rainfall for most of state. Maximum and minimum temperatures are expected to be slightly cooler than average. The following pages contain graphics of the seasonal outlook:

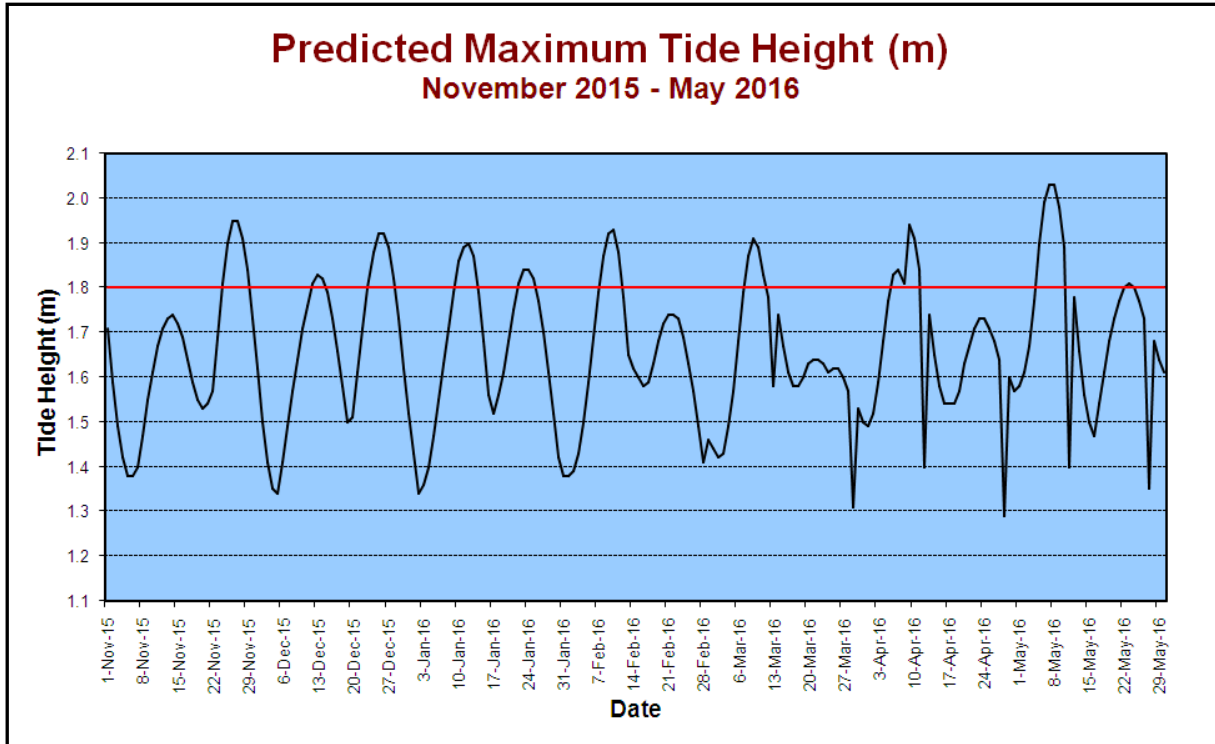
www.bom.gov.au/climate/outlooks/#/rainfall/median (Rainfall outlook).

www.bom.gov.au/climate/outlooks/#/temperature/summary (Max & min temperature outlook).

According to the BOM as of 19/Jan/16, the current strong El Niño is persisting but will decline during the coming months and become neutral by the second quarter of 2016 (note: an El Niño is associated with decreased rainfall eastern Australia, whereas a La Niña is associated with increased rainfall). For more information: www.bom.gov.au/climate/enso/

On 6/Jan/16, the BOM released the Australian Annual Climate Statement for 2015 (www.bom.gov.au/climate/current/annual/aus/). The highlights include: 2015 was the fifth hottest year on record, with the last three months being especially warm; the El Niño event was one of the strongest recorded to date; and rainfall nationally was down by 5%.

Tidal



Tidal information is relevant for the prediction of the activity of the salt marsh mosquito, *Aedes vigilax*. Typically for NSW, tides of over 1.8m can induce hatching of *Aedes vigilax* larvae and the graph below of predicted tide heights can provide some indication of when this is likely to occur.

The high tides over 21-26/Jan/2016 produced no appreciable hatching of *Aedes vigilax* at Homebush Bay (C. Webb *pers. comm.*).

The next series of high tides that may result in *Aedes vigilax* hatching are due to occur over 7-12/Feb/2016, however with the ongoing rain and with the wetlands continue to be flooding, a big larval hatch is not expected.

Note that actual tide heights can vary by 0.3m (or more in unusual circumstances) due to variations in atmospheric pressure, rainfall, wind and other climatic phenomena. Thus predicted tide height should be used as a gauge only for potential *Aedes vigilax* activity. The larvae of the saltmarsh mosquito relies on a inundation/drying cycle for the mudflats in which it lives; continual wet weather prevents the drying cycles thereby reducing larval production.

Full tidal information and the implications of the tide heights relevant to the breeding of the salt marsh mosquito, *Aedes vigilax*, can be obtained from: <http://medent.usyd.edu.au/arbovirus/climate/tideheights201516.htm>

MVEV Climatic Models

Three predictive environmental based models for MVEV activity have been developed; the Forbes (which relies on rainfall in the river catchment basins of Eastern Australia), Nichols (based on the Southern Oscillation), and the Bennett theory (based on the Indian Ocean Dipole). The latter theory is poorly developed (and unreliable), and is not considered below. Note that all the predictive models have been developed on a limited data set and do not always forecast activity. There can also be unusual environmental conditions that may lead to the introduction of the virus to southeastern Australia, such as the movement of low pressure cells from the north to the south of the country during 2008 and 2011. Vertical transmission of the virus (from adult to the egg in *Aedes* species) can result in restricted activity following localised heavy precipitation (as per 2003 at Menindee).

i. Forbes' Hypothesis

Rainfall was not above Decile 7 in all of the river catchment basins in eastern Australia for the last quarter of 2014 or most of the catchments for the first quarter of 2015 (Table 1). For the Oct-Dec 2015 period, rainfall was not above Decile 7 in all catchment basins.

Table 1. Rainfall indices for the main catchment basins of eastern Australia as per Forbes' hypothesis, relevant to the 2015-2016 season. Note that a value of 1 equals Deciles 7 rainfall.

Catchment Basin	Oct-Dec 2014	Jan-Mar 2015	Oct-Dec 2015	Jan-Mar 2016
Darling River	0.80	0.65	0.72	
Lachlan/Murrumbidgee/Murray Rivers	0.97	1.05	0.70	
Northern Rivers	0.94	0.67	1.35	
North Lake Eyre system	1.07	0.67	1.35	

ii. Nichol's Hypothesis

Table 2. The seasonal atmospheric pressures (in mm) according to Nichol's hypothesis, relevant to the 2015-2016 season.

	Autumn 2015	Winter 2015	Spring 2015
2015 Value	1010.83	1014.37	1014.57
Pre past MVEV seasons	<1009.74	<1012.99	<1009.99

None of seasonal periods pertaining to the Nichol's hypothesis are in line with past MVEV active years.

ARBOVIRAL ISOLATES

LOCATION - Site	Date Trapped	Mosquito Species	Virus

*Detection via Honey-Baited Cards, mosquito species can not be determined.
<http://medent.usyd.edu.au/arbovirus/results/virusisolates.htm>

HUMAN NOTIFICATIONS

Weekly notifications of human mosquito-borne diseases infections are available from the NSW Ministry of Health, Communicable Disease Weekly Report and summarised in the Table below*:

www.health.nsw.gov.au/Infectious/reports/Pages/CDWR.aspx

Notifications of Mosquito-Borne Disease in NSW, 2015-2016*

Week Ending	RRV	BFV	DENV	Malaria	CHIKV	Total
5-Jul-15	14	4	5	2	0	25
12-Jul-15	13	3	2	0	1	19
19-Jul-15	7	0	4	1	0	12
26-Jul-15	19	0	3	0	0	22
2-Aug-15	21	2	4	1	0	28
9-Aug-15	12	3	1	0	0	16
16-Aug-15	16	3	4	2	1	26
23-Aug-15	12	1	2	2	0	17
30-Aug-15	27	2	5	2	0	36
6-Sep-15	8	3	6	1	0	18
13-Sep-15	12	0	3	0	1	16
20-Sep-15	24	5	1	0	0	30
27-Sep-15	11	0	1	1	0	13
4-Oct-15	16	2	1	0	0	19
11-Oct-15	11	2	4	0	0	17
18-Oct-15	17	1	5	0	0	23
25-Oct-15	19	2	4	1	0	26
1-Nov-15	16	2	5	1	0	24
8-Nov-15	17	2	6	2	0	27
15-Nov-15	25	2	4	1	0	32
22-Nov-15	19	1	4	0	0	24
29-Nov-15	19	3	8	4	0	34
6-Dec-15	13	1	5	0	0	19
13-Dec-15	15	0	7	1	0	23
20-Dec-15	17	0	8	0	0	25
27-Dec-15	15	0	3	1	0	19
Total	415	44	105	23	3	590

Week Ending	RRV	BFV	DENV	Malaria	CHIKV	Total
3-Jan-16	7	1	7	1	0	16
10-Jan-16	12	1	5	0	0	18
17-Jan-16	3	2	3	2	0	10
Total	447	48	120	26	3	634

Comment: last season saw the largest outbreak of RRV since notifications began to be reported on a routine basis in 1985. The high number of RRV notifications during the winter months of this year makes no epidemiological sense as vector numbers are low and the risk of acquiring the virus is small. These reports are highly unlikely to represent recent infections (recent as in the previous week) and could relate to delays in notifications, past infections as IgM can persist for long periods, or errors in the serological testing. For early January, the number of notifications are not extraordinary and lower than the previous two years.

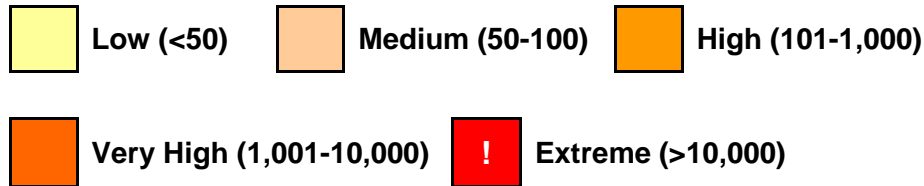
It should also be noted that notifications are for NSW residents and that infection may have been acquired elsewhere.

*The data in this table is updated once available from NSW Health.

MOSQUITO RESULTS

All the full mosquito results can be obtained from:
<http://medent.usyd.edu.au/arbovirus/results/results.htm#site>

Mosquito abundances are best described in relative terms, and in keeping with the terminology from previous NSWASP Annual Reports, mosquito numbers are depicted on the tables below as:



Each location represents the average for all trapping sites at that location.

Inland

Location	Mosquito	Nov-15					Dec				Jan-16					Feb				Mar				Apr			
		1	8	15	22	29	6	13	20	27	3	10	17	24	31	7	14	21	28	6	13	20	27	3	10	17	24
Albury	<i>Cx. annul</i>																										
	Total Mosq.																										
Bourke	<i>Cx. annul</i>																										
	Total Mosq.																										
Griffith	<i>Cx. annul</i>																										
	Total Mosq.																										
Leeton	<i>Cx. annul</i>																										
	Total Mosq.																										
Macquarie Marshes	<i>Cx. annul</i>																										
	Total Mosq.																										
Mathoura	<i>Cx. annul</i>																										
	Total Mosq.																										
Wagga	<i>Cx. annul</i>																										
	Total Mosq.																										

Coastal

Location	Mosquito	Nov-15					Dec				Jan-16					Feb				Mar				Apr			
		1	8	15	22	29	6	13	20	27	3	10	17	24	31	7	14	21	28	6	13	20	27	3	10	17	24
Ballina	<i>Ae. vigilax</i>																										
	Total Mosq.																										
Coffs Harbour	<i>Ae. vigilax</i>																										
	Total Mosq.																										
Gosford	<i>Ae. vigilax</i>																										
	Total Mosq.																										
Lake Macquarie	<i>Ae. vigilax</i>																										
	Total Mosq.																										
Nambucca	<i>Ae. vigilax</i>																										
	Total Mosq.																										
Port Macquarie	<i>Ae. vigilax</i>																										
	Total Mosq.																										
Shoal-haven	<i>Ae. vigilax</i>																										
	Total Mosq.																										
Tweed	<i>Ae. vigilax</i>																										
	Total Mosq.																										
Wyong	<i>Ae. vigilax</i>																										
	Total Mosq.																										

Sydney

Location	Mosquito	Nov-15					Dec				Jan-16					Feb				Mar				Apr			
		1	8	15	22	29	6	13	20	27	3	10	17	24	31	7	14	21	28	6	13	20	27	3	10	17	24
Banks-town	<i>Ae. vigilax</i>																										
	Total Mosq.																										
Blacktown	<i>Ae. vigilax</i>																										
	Total Mosq.																										
Georges River	<i>Ae. vigilax</i>																										
	Total Mosq.																										
Hawkes-bury	<i>Ae. vigilax</i>																										
	Total Mosq.																										
Penrith	<i>Ae. vigilax</i>																										
	Total Mosq.																										
Sydney Olympic Park	<i>Ae. vigilax</i>																										
	Total Mosq.																										
Ryde	<i>Ae. vigilax</i>																										
	Total Mosq.																										

Sentinel Chicken Seroconversions

http://medent.usyd.edu.au/arbovirus/results/chicken_results_all_sites.htm

Location	Nov-15					Dec				Jan-16					Feb				Mar				Apr				
	1	8	15	22	29	6	13	20	27	3	10	17	24	31	7	14	21	28	6	13	20	27	3	10	17	24	
Bourke																											
Deniliquin	15N	15N	15N		15N																						
Forbes			15N	15N	15N	15N																					
Griffith	15N	15N	15N	15N	15N	15N																					
Hay	15N	15N	13N	15N	15N	15N																					
Leeton	15N	15N	15N		15N	15N																					
Macquarie Marshes		15N	13N	15N	15N																						
Menindee	6N	15N	15N	15N																							
Moama	15N																										
Moree																											
Wee Waa			13N	14N	15N																						

N= Negative for MVEV & KUNV

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