

NSW ARBOVIRUS SURVEILLANCE & MOSQUITO MONITORING PROGRAM 2015-2016

Weekly Update

Date: 8/Jan/2016

SUMMARY

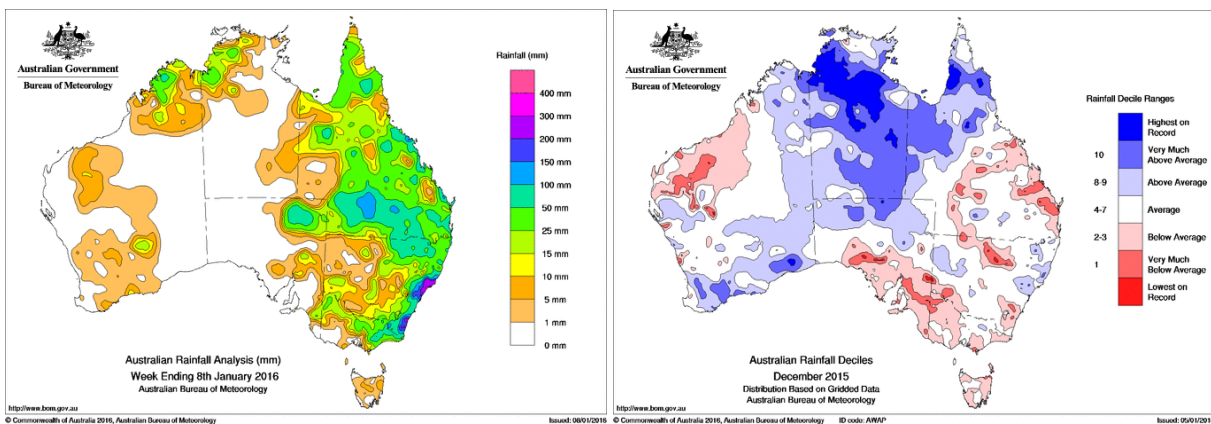
- **Climate:** over the last week, light rainfall occurred in the north east of the state. For December, rainfall was mostly around average, although there were pockets of the state that had either above or below average rainfall. Maximum and minimum temperatures for December were 1-2 degrees above average, with hotter than normal conditions in the west and south west of the state. The year 2015 was one of the hottest on record, with national rainfall down by 5%.
- **Three Month Forecast:** for January to March 2016, rainfall predictions for NSW are for average rainfall for most of the state, with below average for the south east. According to the BOM as of 5/Jan/16, the current El Niño has peaked in recent weeks and that it should decline during the coming months.
- **Tidal:** the next series of high tides that may result in *Aedes vigilax* hatching are due to occur over 11-15/Jan/2016. The high tides over Christmas resulted in flooding of the wetlands at Homebush Bay, with a treatment ensuing.
- **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:** Hanwood at Griffith yielded another 'very high' collection, however all other locations had 'low' to 'medium' numbers.
- **Mosquito Numbers Coast:** mosquito collections were mostly 'low'.
- **Mosquito Numbers Sydney** mosquito collections were mostly 'low'.
- **Arboviral Isolates:** there were no arboviral detections in the mosquitoes.
- **Chicken Sentinel Seroconversions:** there were no seroconversions.
- **Human Notifications:** for the current fiscal year, there have been 429 RRV and 44 BFV notifications.

Comment: unless you have been interstate or overseas over the last few days, or still recovering from New Year's Eve celebrations, then you would know it has been wet, in fact very wet in many parts of the state. The heavy rains, along with the cool weather has ensured that mosquito collections have been quite small this week. With all the water about, and the prediction of warmer weather ahead, mosquito numbers are expected to rise. There have been no mosquito isolates or seroconversions in the sentinel chooks.

ENVIRONMENTAL CONDITIONS

Rainfall

Rainfall across Australia for the week ending 8/Jan/2016 is depicted on the left and monthly rainfall deciles for December 2015 are on the right. Over the last week, moderate to heavy rainfall occurred across the entire state, with intense activity on the south coast and from Sydney to Newcastle. 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 January to March 2016, rainfall predictions for NSW are for average rainfall for most of the state, with below average for the south east. Maximum and minimum temperatures are expected to be above normal for the north east of the state and below average for the south west. The following pages contain graphics of the seasonal outlook:

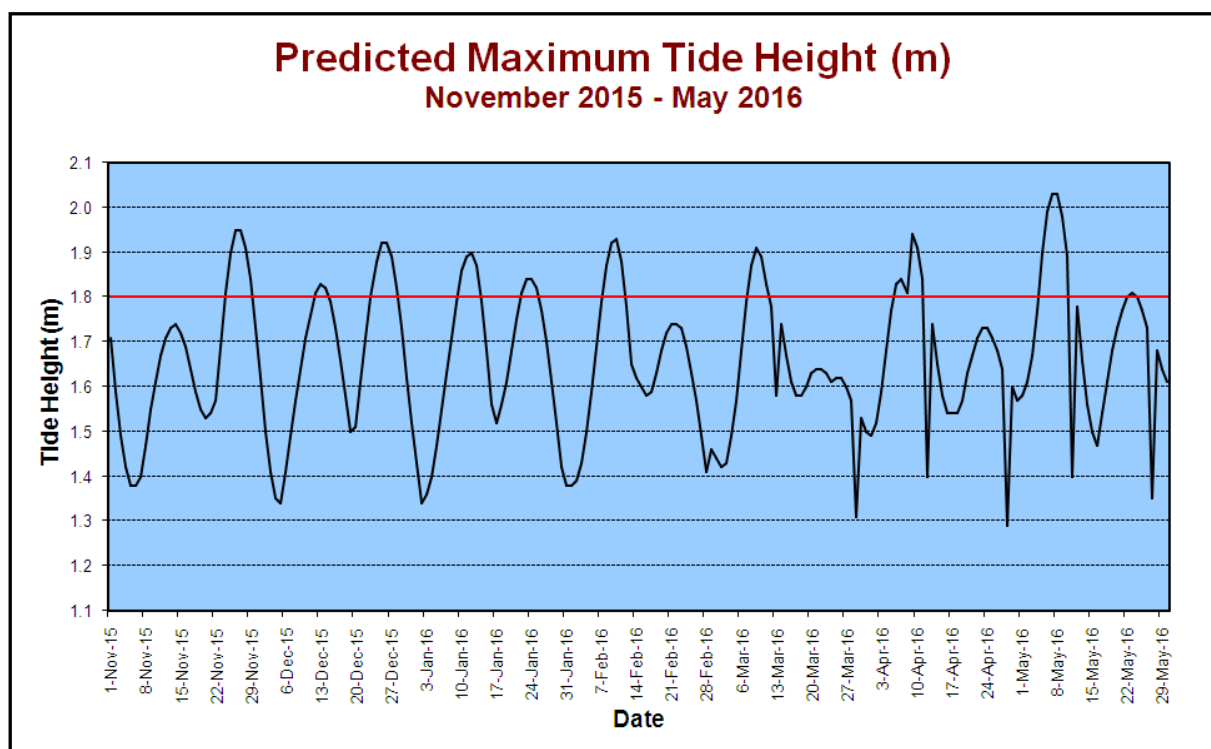
www.bom.gov.au/climate/outlooks/#/rainfall/median (Rainfall outlook).

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

According to the BOM as of 5/Jan/16, the current El Niño has peaked in recent weeks and that it should decline during the coming months (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.

At Homebush Bay, the recent series of high tides around Christmas did result in some flooding of the wetlands, which resulted in an aerial treatment (C. Webb, *pers. comm.*).

The next series of high tides that may result in *Aedes vigilax* hatching are due to occur 11-15/Jan/2016.

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:

<http://www.health.nsw.gov.au/Infectious/reports/Pages/Communicable-Diseases-Weekly-Report.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
3-Jan-16	14	1	1	1	0	17
Total	429	45	106	24	3	607

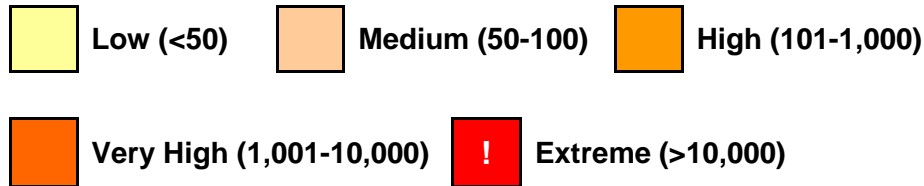
Comment: last season saw the largest outbreak of RRV since notifications began to be reported on a routine basis in 1985. The high number of RRV notifications during the winter months of this year makes no epidemiological sense as vector numbers are low and the risk of acquiring the virus is small. These 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. **It should also be noted that notifications are for NSW residents and that infection may have been acquired elsewhere.**

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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