

# NSW ARBOVIRUS SURVEILLANCE & MOSQUITO MONITORING PROGRAM 2015-2016

## Weekly Update

Date: 5/Feb/2016

### SUMMARY

- **Climate:** the last week, most of the state received moderate to heavy rainfall. For January, rainfall was above average for most of the state and well above average for the south east. Maximum and minimum temperatures for January were mostly around average.
- **Three Month Forecast:** for February to April 2016, rainfall predictions for NSW are for slightly above average rainfall for most of state. Maximum and minimum temperatures are expected to be slightly cooler than normal. According to the BOM as of 2/Feb/16, the El Niño remains strong but continues to decline and should 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 January 2016 and both theories remain inconsistent with past MVEV outbreaks.
- **Mosquito Numbers Inland:** mosquito numbers overall are below average, with Griffith trapping 'high' numbers this week; this is well below the norm for this time of the year.
- **Mosquito Numbers Coast:** while there were some 'high' collections made, numbers of *Aedes vigilax* continue to remain 'low', and collections tended to be unremarkable.
- **Mosquito Numbers Sydney:** 'high' collections were made at several Sydney sites, although 'low' numbers of *Aedes vigilax* were trapped.
- **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 454 RRV and 48 BFV notifications. The notifications for 2016 are lower than the previous two years. There have been two imported cases of Zika virus infection, both acquired from Haiti in the Caribbean.

**Comment:** while arboviruses are dominating the news from overseas, at home in NSW we are having a very quiet mosquito/arboviral season. Human notifications are down and there have been no isolates detected from the mosquitoes nor any seroconversions in the sentinel chooks.

Many of you may have heard of the detection of the exotic mosquito, *Aedes aegypti*, at Sydney Airport. Thus I have included brief report about this event.

## Detection of *Aedes aegypti* at Sydney Airport

Over the last two years there has been an increasing number of detections of exotic mosquitoes at major ports around Australia. The main species have been *Aedes aegypti* and *Aedes albopictus*, both known vectors of major arboviral diseases such as Dengue, Chikungunya and Zika viruses. Neither mosquito presently occurs in NSW, and of the two, *Aedes albopictus* represents the greater risk as it is a more cold tolerate species, and could become established in NSW. The reasons behind the increase in detections is presently unclear, but may relate to the development of insecticide resistance. Further investigations are currently underway.

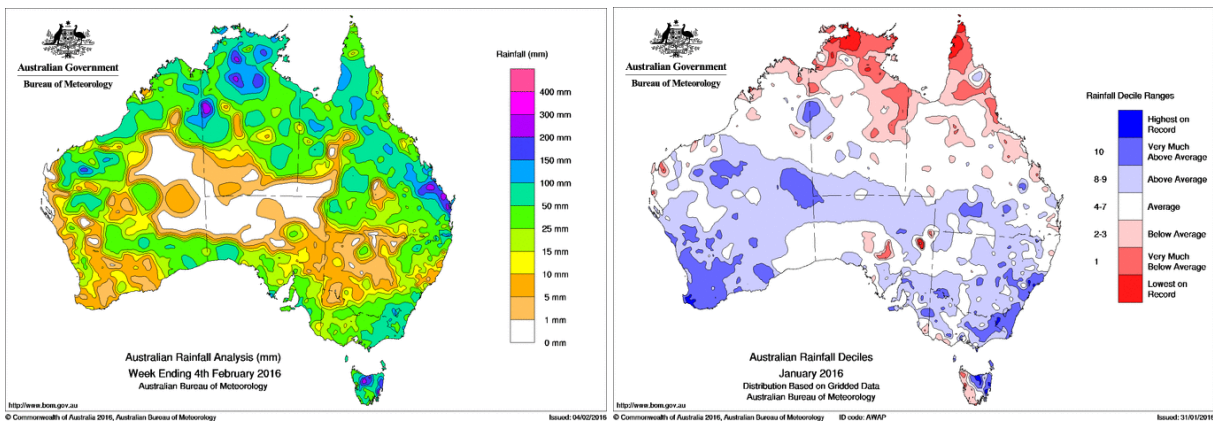
Prior to 2016, these mosquitoes had never been found at Sydney airport, however *Aedes aegypti* was detected in mid-January in one of the baggage handling areas. As a result, insecticide treatment of the area was undertaken, enhanced surveillance initiated, and surveys looking for possible larval breeding commenced.

NSW Health has been working closely with the Department of Agriculture and Water Resource, the Sydney Airport Corporation Limited, and the Department of Medical Entomology, to identify and to ameliorate the risk of the introduction of these exotics. As of February, there have been no further detections.

## ENVIRONMENTAL CONDITIONS

### Rainfall

Rainfall across Australia for the week ending 4/Feb/2016 is depicted on the left and monthly rainfall deciles for January 2016 are on the right. Over the last week, most of the state received moderate to heavy rainfall. For January, rainfall was above average for most of the state and well above average for the south east. Maximum and minimum temperatures for January were mostly around average.



### Three Month Rainfall & Temperature Forecast

For February to April 2016, rainfall predictions for NSW are for slightly above 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:

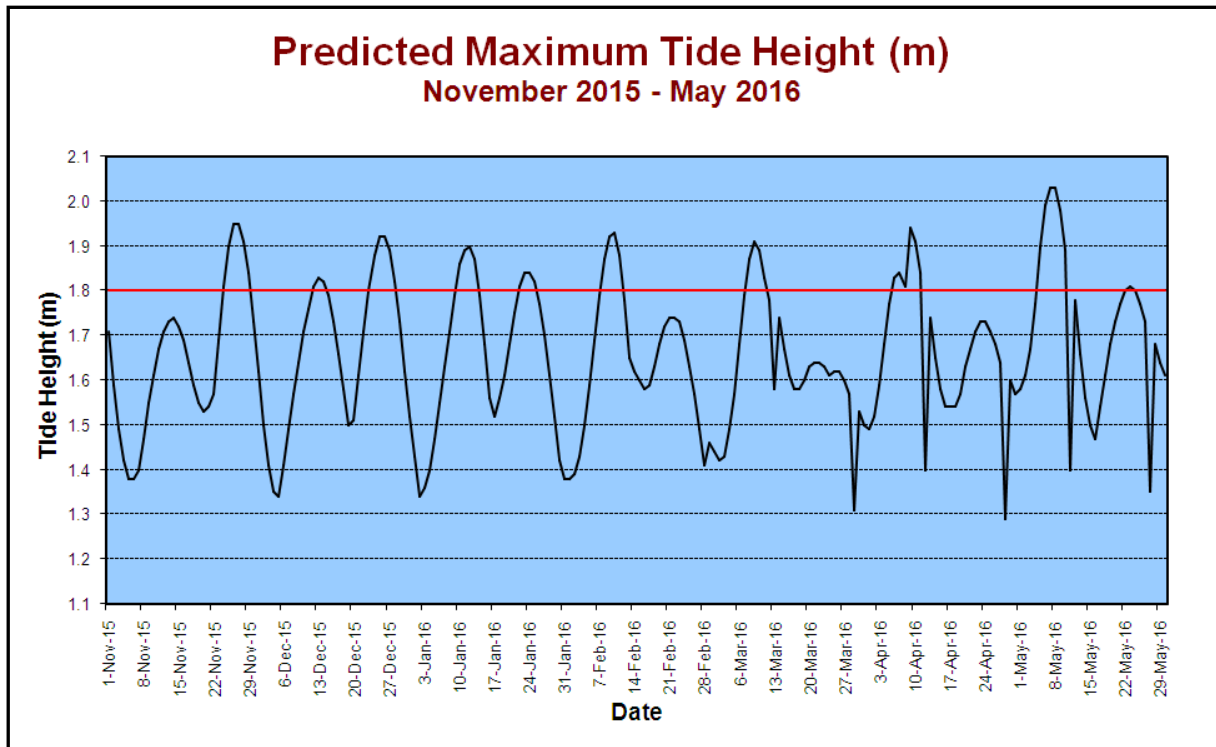
[www.bom.gov.au/climate/outlooks/#/rainfall/median](http://www.bom.gov.au/climate/outlooks/#/rainfall/median) (Rainfall outlook).

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

According to the BOM as of 2/Feb/16, the current El Niño is remaining strong but continues to decline and models suggest a return to 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/](http://www.bom.gov.au/climate/enso/)

On 2/Jan/16, the BOM released the Australian Annual Climate Statement for 2015 ([www.bom.gov.au/climate/current/annual/aus/](http://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 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. For Jan-Mar 2016, based on the January data alone, 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	1.23
Lachlan/Murrumbidgee/Murray Rivers	0.97	1.05	0.70	5.82
Northern Rivers	0.94	0.67	1.35	0.55
North Lake Eyre system	1.07	0.67	1.35	0.54

\*Data for January 2016 only

### 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](http://www.health.nsw.gov.au/Infectious/reports/Pages/CDWR.aspx)

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

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

<sup>†</sup>All of these viruses are acquired overseas.

Week Ending	RRV	BFV	DENV <sup>†</sup>	Malaria <sup>†</sup>	CHIKV <sup>†</sup>	ZIKV <sup>†</sup>	Total
3-Jan-16	7	1	7	1	0	1	17
10-Jan-16	12	1	5	0	0	0	18
17-Jan-16	3	2	3	2	0	0	10
24-Jan-16	7	0	7	0	1	1	16
<b>Total</b>	<b>454</b>	<b>48</b>	<b>127</b>	<b>26</b>	<b>4</b>	<b>2</b>	<b>651</b>

<sup>†</sup>All of these viruses are acquired overseas.

*Comment:* For January, the number of notifications are not extraordinary and lower than the previous two years. Both Zika virus cases were acquired from Haiti.

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

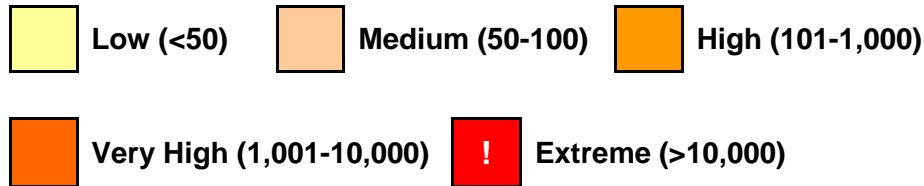
\*The data in this table is updated once available from the NSW Ministry of Health.



## 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
<a href="#">Albury</a>	<i>Cx. annul</i>																										
	Total Mosq.																										
<a href="#">Bourke</a>	<i>Cx. annul</i>																										
	Total Mosq.																										
<a href="#">Griffith</a>	<i>Cx. annul</i>																										
	Total Mosq.																										
<a href="#">Leeton</a>	<i>Cx. annul</i>																										
	Total Mosq.																										
<a href="#">Macquarie Marshes</a>	<i>Cx. annul</i>																										
	Total Mosq.																										
<a href="#">Mathoura</a>	<i>Cx. annul</i>																										
	Total Mosq.																										
<a href="#">Wagga</a>	<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
<a href="#">Ballina</a>	<i>Ae. vigilax</i>																										
	Total Mosq.																										
<a href="#">Coffs Harbour</a>	<i>Ae. vigilax</i>																										
	Total Mosq.																										
<a href="#">Gosford</a>	<i>Ae. vigilax</i>																										
	Total Mosq.																										
<a href="#">Lake Macquarie</a>	<i>Ae. vigilax</i>																										
	Total Mosq.																										
<a href="#">Nambucca</a>	<i>Ae. vigilax</i>																										
	Total Mosq.																										
<a href="#">Port Macquarie</a>	<i>Ae. vigilax</i>																										
	Total Mosq.																										
<a href="#">Shoal-haven</a>	<i>Ae. vigilax</i>																										
	Total Mosq.																										
<a href="#">Tweed</a>	<i>Ae. vigilax</i>																										
	Total Mosq.																										
<a href="#">Wyong</a>	<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
<a href="#">Banks-town</a>	<i>Ae. vigilax</i>																										
	Total Mosq.																										
<a href="#">Blacktown</a>	<i>Ae. vigilax</i>																										
	Total Mosq.																										
<a href="#">Georges River</a>	<i>Ae. vigilax</i>																										
	Total Mosq.																										
<a href="#">Hawkes-bury</a>	<i>Ae. vigilax</i>																										
	Total Mosq.																										
<a href="#">Penrith</a>	<i>Ae. vigilax</i>																										
	Total Mosq.																										
<a href="#">Sydney Olympic Park</a>	<i>Ae. vigilax</i>																										
	Total Mosq.																										
<a href="#">Ryde</a>	<i>Ae. vigilax</i>																										
	Total Mosq.																										

## Sentinel Chicken Seroconversions

[http://medent.usyd.edu.au/arbovirus/results/chicken\\_results\\_all\\_sites.htm](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	
<a href="#">Bourke</a>																											
<a href="#">Deniliquin</a>	15N	15N	15N		15N																						
<a href="#">Forbes</a>			15N	15N	15N	15N																					
<a href="#">Griffith</a>	15N	15N	15N	15N	15N	15N																					
<a href="#">Hay</a>	15N	15N	13N	15N	15N	15N																					
<a href="#">Leeton</a>	15N	15N	15N		15N	15N																					
<a href="#">Macquarie Marshes</a>		15N	13N	15N	15N																						
<a href="#">Menindee</a>	6N	15N	15N	15N																							
<a href="#">Moama</a>	15N																										
<a href="#">Moree</a>																											
<a href="#">Wee Waa</a>			13N	14N	15N																						

N= Negative for MVEV & KUNV

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