

# NSW ARBOVIRUS SURVEILLANCE & MOSQUITO MONITORING PROGRAM 2015-2016

## Weekly Update

**Date:** 26/Feb/2016

### SUMMARY

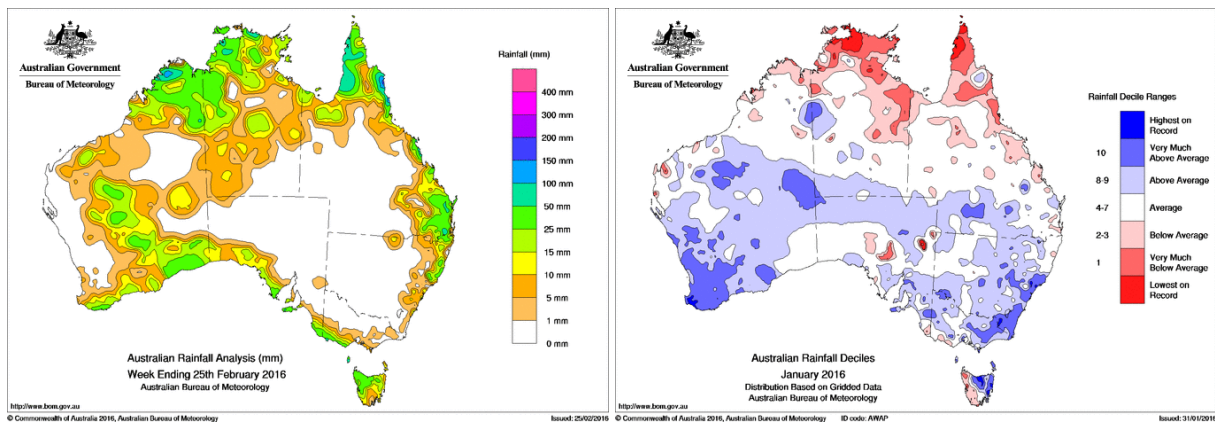
- **Climate:** over the last week, the last week, rainfall was very light and largely confined to northern coastal areas. For January, rainfall was above average for most of the state and well above average for the south east. Maximum and minimum temperatures for January were mostly around average.
- **Three Month Forecast:** for March to May 2016, rainfall predictions for NSW are for slightly above average rainfall for most of state, and the probability of exceeding the average is greater in the south west of the state. Maximum and minimum temperatures are expected to be warmer than normal and higher along the coast. According to the BOM as of 16/Feb/16, the El Niño continues its gradual decline and climatic models suggest a neutral second half of 2016.
- **Tidal:** the next series of high tides are due over 7-12/Mar/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 are overall well below the long term average and 'low' from most sites, although still 'high' from Griffith and Leeton (but below average).
- **Mosquito Numbers Coast:** the mosquito season continues to be quiet with 'low' *Aedes vigilax* numbers from all sites.
- **Mosquito Numbers Sydney:** several sites produced 'high' collections this week including Homebush, Hawkesbury and the new trapping site of the Hills Shire. *Aedes vigilax* numbers continue to remain mostly 'low', although were high at Homebush.
- **Arboviral Isolates:** there were no further arboviral detections.
- **Chicken Sentinel Seroconversions:** there were no seroconversions.
- **Human Notifications:** for the current fiscal year, there have been 491 RRV and 49 BFV notifications. The notifications for 2016 are lower than the comparable period for 2015 and similar to 2014.

**Comment:** the dry weather continues and all remains quiet on the mosquito and arbovirus season for 2015-16. Mosquito numbers continue to remain below average, there have been few arboviral isolates from the mosquitoes and no seroconversions in the sentinel chickens. The forecast for next season is for a wetter year, which may pose an increased risk for the 2016-2017 season.

## ENVIRONMENTAL CONDITIONS

### Rainfall

Rainfall across Australia for the week ending 25/Feb/2016 is depicted on the left and monthly rainfall deciles for January 2016 are on the right. Over the last week, rainfall was very light and largely confined to northern coastal areas. 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.



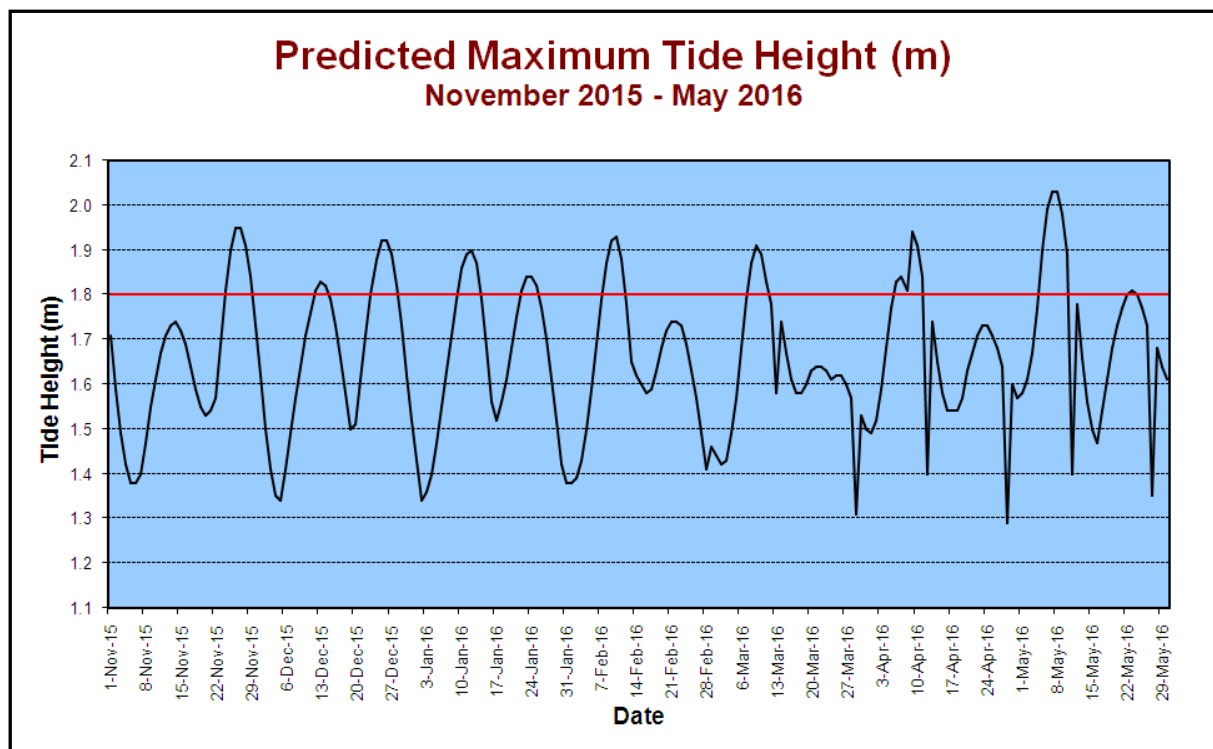
### Three Month Rainfall & Temperature Forecast

For March to May 2016, rainfall predictions for NSW are for slightly above average rainfall for most of state, and the probability of exceeding the average is greater in the south west of the state. Maximum and minimum temperatures are expected to be above average, with warmer conditions towards the coast and especially the southeast of NSW. 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 16/Feb/16, the current El Niño continues its gradual decline. Climate models suggest a neutral period for the second half of 2016, although a La Niña cannot be ruled out (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/Mar/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. 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
PORT MACQUARIE – Stevens St	8/Feb/16	*	EHV
GRIFFITH – Hanwood	1/Feb/16	<i>Culex annulirostris</i>	BFV

\*Detection via Honey-Baited Cards, the mosquito species cannot 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>

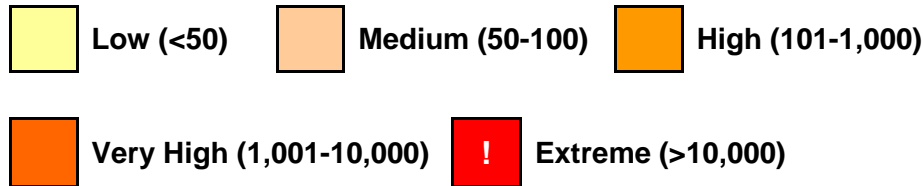
<sup>†</sup>All of these viruses are acquired overseas, although some DENV cases may be from North Queensland.



## 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="#">Port Macquarie</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="#">Hills Shire</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	14N	15N	12N	15N	15N	15N	15N	15N	15N	15N											
<a href="#">Forbes</a>			15N	15N	15N	15N	15N	15N	15N	15N	15N	15N	15N	15N	15N											
<a href="#">Griffith</a>	15N	15N	15N	15N	15N	15N	15N	14N		14N	14N	14N	15N	14N	14N											
<a href="#">Hay</a>	15N	15N	13N	15N	15N	15N	15N	15N	15N	15N	15N	15N	15N	15N	15N											
<a href="#">Leeton</a>	15N	15N	15N		15N	15N	15N	14N	14N	14N	14N	13N	13N	13N	13N	13N										
<a href="#">Macquarie Marshes</a>		15N	13N	15N	15N		15N		15N	15N		15N	15N	15N												
<a href="#">Menindee</a>	6N	15N	15N	15N		15N	15N	15N	15N		15N	15N	15N	15N	15N											
<a href="#">Moama</a>	15N					15N																				
<a href="#">Moree</a>							15N	15N	15N	15N	15N	15N	15N	15N	15N	15N										
<a href="#">Wee Waa</a>			13N	14N	15N		15N	15N		15N	15N			15N	13N											

N= Negative for MVEV & KUNV

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