

# NSW ARBOVIRUS SURVEILLANCE & MOSQUITO MONITORING PROGRAM 2017-2018

## Weekly Update

**Date:** 1/Dec/2017

### Summary

- **Climate:** over the last week, there was light rainfall across the state. For November, rainfall was average for much of the state. Heavy rains are forecast for Victoria and southern NSW for tomorrow, Saturday 2/Dec/2017, with 250mm of rains predicted to fall over the weekend.
- **Three Month Forecast:** for December 2017 to February 2018, rainfall predictions for NSW are for average precipitation for most of the state, with a slightly increased probability of above average in the south east. Maximum and minimum temperatures are expected to be above average in the south of the state. According to the BOM as of 21/Nov/17, the La Niña has increased to an alert level with a 70% chance of forming, although it is not expected that rainfall will be greater than normal.
- **Tidal:** the next series of high tides that may result in *Aedes vigilax* hatching are due to occur over the next few days, 2-8/Dec/17. It is worth noting that the spring tides are very high this year and with the dry conditions, enhanced hatching may occur.
- **MVEV models:** the data relevant to both the Forbes' and Nichols' hypotheses have been updated to the end of Oct 2017 and both theories currently are inconsistent with past MVEV outbreaks.
- **Mosquito Numbers Inland:** mosquito numbers were mostly 'low', although Griffith had a 'high' yield.
- **Mosquito Numbers Coast:** surveillance activities are due to begin in December.
- **Mosquito Numbers Sydney:** surveillance is due to begin in December.
- **Arboviral Isolates:** there have been no isolates to date.
- **Chicken Sentinel Seroconversions:** there were no seroconversions to MVEV or KUNV.
- **Human Notifications:** for the current fiscal year, there have been 187 RRV and 32 BFV notifications, this is around average for recent years.

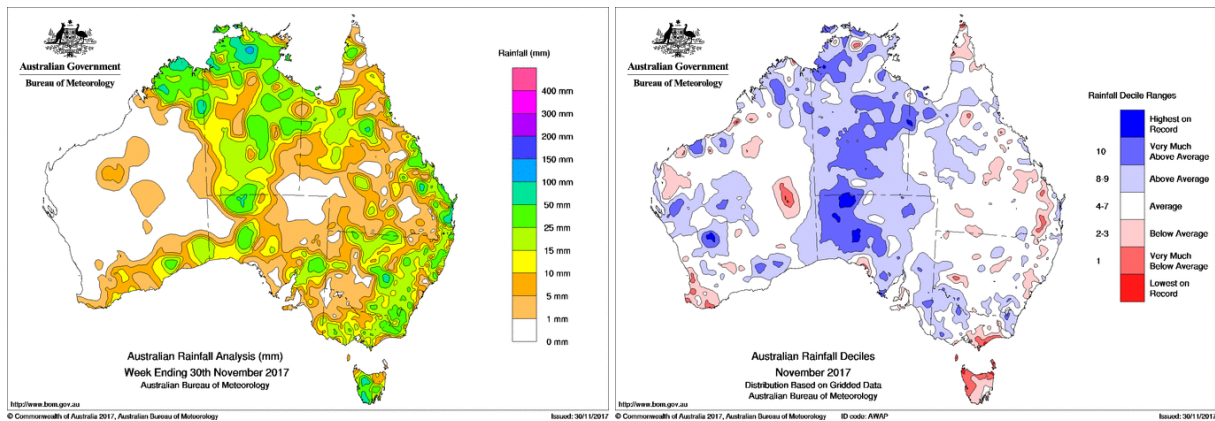
**Comment:** mosquito numbers from the inland remain mostly low and below average for this time of the year. A La Niña alert has been released by the BOM, but it this is not expected to be intense or prolong, and have significant impact on rainfall levels. The heavy rains forecasted for Victoria are expected to impact southern NSW, which are likely to result in increased mosquito numbers.

There was another detection of the exotic mosquito, *Aedes aegypti*, at Sydney Airport on 22/Nov/2017. Outcomes included enhanced surveillance, localized insecticide applications, and a larval survey.

# ENVIRONMENTAL CONDITIONS

## Rainfall

Rainfall across Australia for the week ending 30/Nov/2017 is depicted on the left and monthly rainfall deciles for October 2017 are on the right. Over the last week, there was light rainfall across the state, being heavier along the ranges. For November, rainfall was around average for much of the state. Maximum temperatures for October were 2-3 degrees above normal and warmer to the south. Minimum temperatures were 2-3 degrees above normal and warmer to the north. The BOM has issued a severe weather warning for Victoria and this is likely to affect parts of northern NSW ([www.bom.gov.au/products/IDV21037.shtml](http://www.bom.gov.au/products/IDV21037.shtml)). Increased vector breeding may result in these regions (see also: <http://www.abc.net.au/news/2017-12-01/why-south-east-australia-is-expecting-a-tropical-deluge/9210656>).



## Three Month Rainfall & Temperature Forecast

For December 2017 to February 2018, rainfall predictions for NSW are for average precipitation for most of the state, with a slightly increased probability of above average in the south east. Maximum and minimum temperatures are expected to be above average in the south of the state. 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).

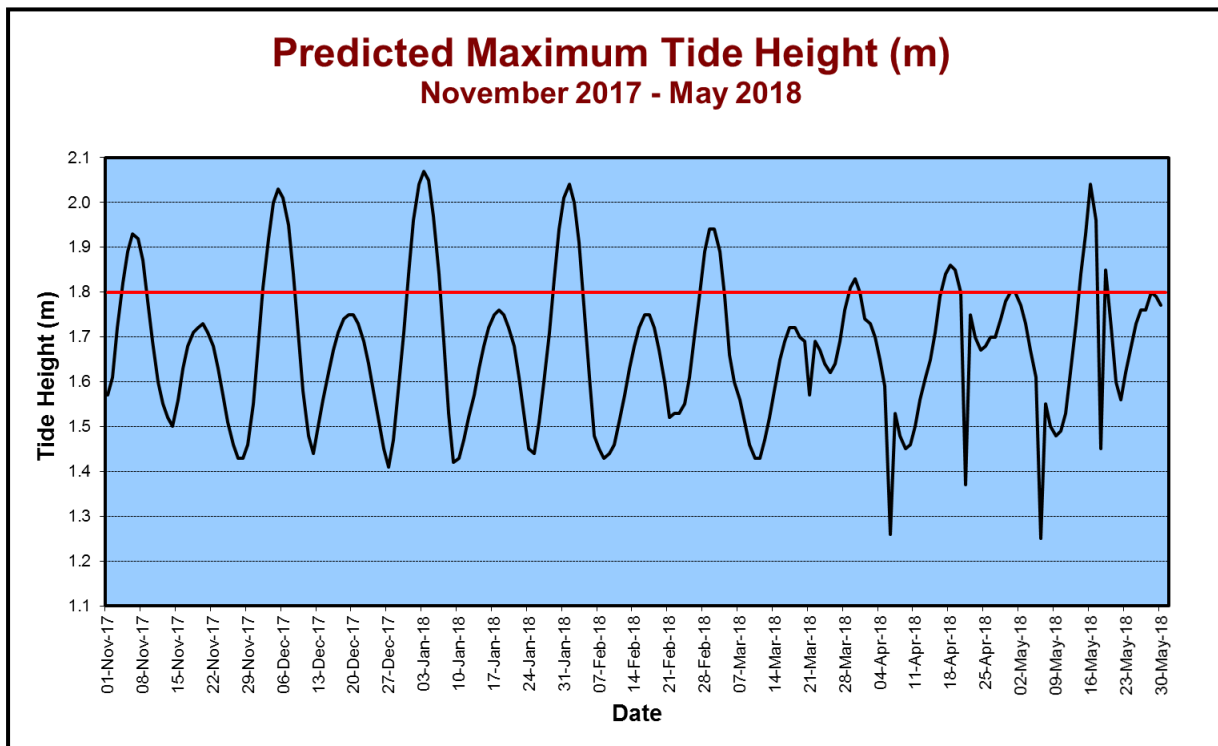
[www.bom.gov.au/climate/outlooks/#/temperature/summary](http://www.bom.gov.au/climate/outlooks/#/temperature/summary) (Max & min temperature outlook).

According to the BOM as of 21/Nov/17, the La Niña watch has increased to an alert level with a 70% chance of forming, however if this forms, it is likely to be weak and short lived. The Indian Ocean Dipole (IOD) remains neutral. This all suggests that rainfall patterns are likely to be around average for the upcoming months.

For more information: [www.bom.gov.au/climate/enso/](http://www.bom.gov.au/climate/enso/) and, <http://www.bom.gov.au/climate/iod/>

## 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 tides that may lead to *Aedes vigilax* hatching are due 2-8/Dec/2017. Note the spring tides are very high this year and with the dry conditions, enhanced hatching may occur.

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.

## 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 2016 or for the first quarter of 2017 (Table 1). For the last quarter of 2017 (October data only), rainfall was above Decile 7 in all but one catchment basin.

**Table 1.** Rainfall indices for the main catchment basins of eastern Australia as per Forbes' hypothesis, relevant to the 2017-2018 season. Note that a value of 1 equals Decile 7 rainfall.

Catchment Basin	Oct-Dec 2016	Jan-Mar 2017	Oct-Dec 2017*	Jan-Mar 2018
Darling River	0.58	0.81	1.47	
Lachlan/Murrumbidgee/Murray Rivers	0.92	1.01	0.75	
Northern Rivers	0.98	1.03	1.40	
North Lake Eyre system	1.09	0.73	1.02	

\*Data for October only.

### ii. Nichol's Hypothesis

**Table 2.** The seasonal atmospheric pressures (in mm) according to Nichol's hypothesis, relevant to the 2017-2018 season (\*data not including Nov/2017).

	Autumn 2017	Winter 2017	Spring 2017*
2016 Value	1009.60	1013.23	1010.85
Pre past MVEV seasons	<1009.74	<1012.99	<1009.99

Only the Autumn period pertaining to the Nichol's hypothesis is in line with past MVEV active years.

## ARBOVIRAL ISOLATES

LOCATION - Site	Date Trapped	Mosquito Species	Virus
Nil to date			

\*Detection via Honey-Baited Cards, the mosquito species cannot be determined.

<http://medent.usyd.edu.au/arbovirus/results/virusisolates.htm>

### Exotic Mosquito Detections

A female *Aedes aegypti* mosquito was trapped at Sydney Airport on 22/Nov/2017, via an EVS trap. The detection occurred in a location 500m from the Domestic Terminal and it is possible the specimen may have come via aircraft travelling from far north Queensland where *Aedes aegypti* is endemic. However, international planes have disembarked nearby and thus other sources for the mosquito cannot be excluded. As per usual protocol, the specimen will be sent for genetic testing in an attempt to establish the introduction pathway.

Emergency responses included an interagency teleconference the following day, enhanced surveillance, localized insecticide applications, and a larval survey. A water filled drum nearby to the detection site was found with larvae and identified as a mixture of the local species, *Aedes notoscriptus* and *Culex quinquefasciatus*. No larval *Aedes aegypti* were found.

At this stage, no further detections of *Aedes aegypti* have occurred.

## 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, 2017-2018\*

Week Ending	RRV	BFV	DENV <sup>†</sup>	Malaria <sup>†</sup>	CHIKV <sup>†</sup>	ZIKV <sup>†</sup>	Total
1-Jul-17	14	6	3	2	0	0	25
8-Jul-17	6	4	0	4	1	0	15
15-Jul-17	8	0	2	1	0	0	11
22-Jul-17	10	3	7	2	0	0	22
29-Jul-17	6	0	2	2	0	0	10
5-Aug-17	8	0	4	0	0	0	12
12-Aug-17	11	1	3	2	5	0	22
19-Aug-17	5	2	1	2	2	0	12
26-Aug-17	6	3	3	2	0	1	15
2-Sep-17	6	0	1	0	1	0	8
9-Sep-17	14	0	1	2	1	0	18
16-Sep-17	9	1	5	0	0	0	15
23-Sep-17	9	1	3	1	0	0	14
30-Sep-17	7	0	1	1	1	0	10
7-Oct-17	7	0	3	2	0	0	12
14-Oct-17	10	1	2	1	0	0	14
21-Oct-17	11	2	8	2	1	0	24
28-Oct-17	16	1	6	1	1	0	25
4-Nov-17	14	3	7	3	1	0	28
11-Nov-17	5	2	7	0	0	0	14
18-Nov-17	3	2	6	0	0	0	11
<b>Total</b>	<b>185</b>	<b>32</b>	<b>75</b>	<b>30</b>	<b>14</b>	<b>1</b>	<b>337</b>

<sup>†</sup>All of these viruses are acquired overseas, although some DENV cases may be from North Queensland. \*The data in this table is updated once available from the NSW Ministry of Health.

**Comment:** It should also be noted that notifications are for NSW residents and that infection may have been acquired elsewhere and that winter notifications of RRV are likely to be false positives.

**Table 6.** Ross River virus infection notifications in NSW residents, by month of disease onset per fiscal year, July 2013 to November 2017\*.

<b>Year</b>	<b>Jul</b>	<b>Aug</b>	<b>Sep</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Apr</b>	<b>May</b>	<b>Jun</b>	<b>Total</b>
<b>2013-2014</b>	36	23	27	36	30	30	33	35	44	72	86	57	<b>509</b>
<b>2014-2015</b>	38	50	46	67	59	90	117	305	431	264	102	50	<b>1,619</b>
<b>2015-2016</b>	54	61	53	61	70	54	42	60	78	79	52	16	<b>680</b>
<b>2016-2017</b>	12	11	20	17	38	216	429	274	200	142	174	89	<b>1,622</b>
<b>2017-2018</b>	29	40	53	52	13								<b>187</b>

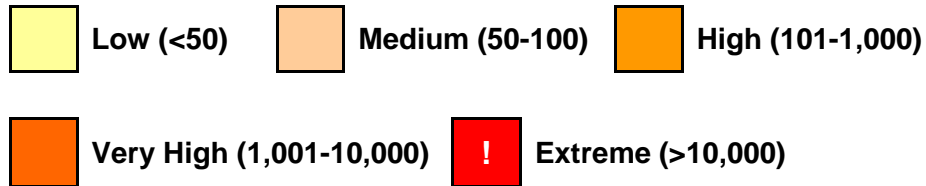
\*updated 16/Nov/2017 (this table is updated more regularly than Table 5 above, hence there maybe differences in the numbers). Table modified from:

<http://www0.health.nsw.gov.au/data/diseases/rossriver.asp>

## 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	Oct-17					Nov				Dec					Jan-18				Feb				Mar			
		1	8	15	22	29	5	12	19	26	3	10	17	21	28	7	14	21	28	4	11	18	25	4	11	18	25
<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				Dec				Jan-18				Feb				Mar				Apr					
		5	12	19	26	3	5	12	19	26	7	14	21	28	4	11	18	25	4	11	18	25	1	8	15	22	29
<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				Dec					Jan-18				Feb				Mar				Apr				
		5	12	19	26	3	5	12	19	26	7	14	21	28	4	11	18	25	4	11	18	25	1	8	15	22	29
<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	Oct-17					Nov				Dec					Jan-18				Feb				Mar				
	1	8	15	22	29	5	12	19	26	3	10	17	21	28	7	14	21	28	4	11	18	25	4	11	18	25	
<a href="#">Bourke</a>																											
<a href="#">Deniliquin</a>						15N	14N	15N																			
<a href="#">Dubbo</a>						15N	15N	15N	15N																		
<a href="#">Forbes</a>						15N		15N																			
<a href="#">Griffith</a>					15N	15N	15N	15N																			
<a href="#">Hay</a>					15N	15N	15N																				
<a href="#">Leeton</a>						15N	15N																				
<a href="#">Macquarie Marshes</a>							15N	15N																			
<a href="#">Menindee</a>																											
<a href="#">Moama</a>																											
<a href="#">Moree</a>																											
<a href="#">Wee Waa</a>																											

N= Negative for MVEV & KUNV

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