

# NSW ARBOVIRUS SURVEILLANCE & MOSQUITO MONITORING PROGRAM 2016-2017

## Weekly Update

Date: 24/Oct/2016

### SUMMARY

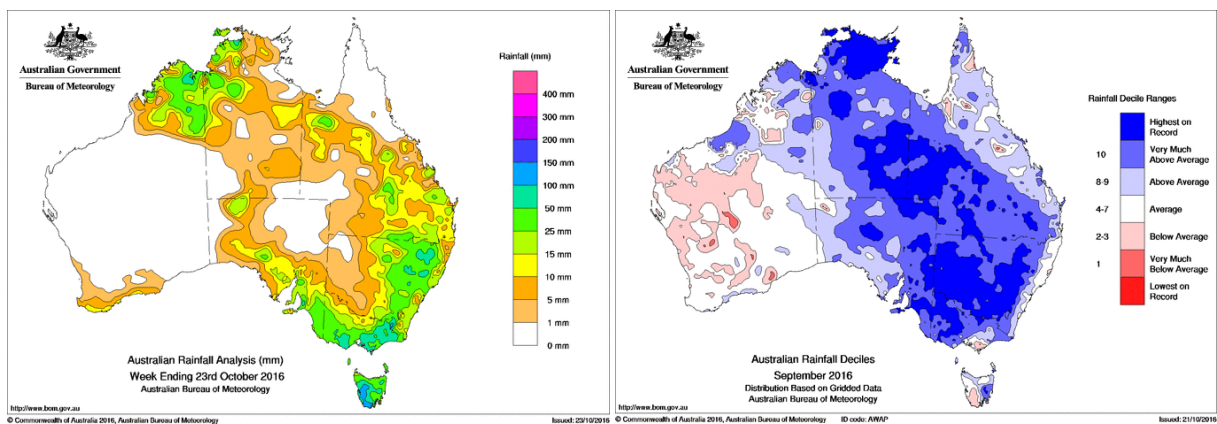
- **Climate:** over the last week, there was moderate rainfall across most of the state, being heaviest along the ranges. For September, rainfall was very much above average to highest on record for much of the inland, with the coast experiencing average precipitation. Maximum temperatures for September were 3-4 degrees below average, while minimum temperatures were around normal.
- **Three Month Forecast:** October to December 2016, rainfall predictions for NSW are for above average for most of the state, with an increasing probability of above average in the southern regions, especially along the Murray. Maximum and minimum temperatures are expected to be below average across the state. According to the BOM as of 11/Oct/16, the current tropical Pacific Ocean El Niño-Southern Oscillation remains neutral and this is unlikely to change to the end of the summer; thus normal rainfall is expected ahead.
- **Tidal:** the next series of high tides that may result in *Aedes vigilax* hatching are due to occur over 13-19/Nov/16.
- **MVEV models:** the data relevant to both the Forbes' and Nichols' hypotheses have been updated to the end of Sep 2016 and both theories remain inconsistent with past MVEV outbreaks.
- **Mosquito Numbers Inland:** mosquito numbers were 'very high' from three of the four sites (Albury, Griffith and Leeton) and 'high' from the fourth (Wagga), being dominated by *Culex australicus*.
- **Mosquito Numbers Coast:** surveillance activities are due to begin in December.
- **Mosquito Numbers Sydney:** surveillance activities are largely due to begin in December.
- **Arboviral Isolates:** the first batch of samples are currently being processed.
- **Chicken Sentinel Seroconversions:** no report has been issued to date.
- **Human Notifications:** for the current fiscal year, there have been 46 RRV and 4 BFV notifications; the total represents around half the long term average.

**Comment:** this is the first weekly report for the 2016-2017 season of the NSW Arbovirus Surveillance Program and *already the warning bells are ringing!* The huge amount of flooding in recent weeks across the inland (along with the continuing wet conditions since May), has resulted in massive mosquito breeding with unprecedented collections for this time of the year. Almost 15,000 mosquitoes were collected from the four inland sites during the first week of trapping, where the norm would be a few hundred. While *Culex australicus* dominated, this species will be replaced by *Culex annulirostris* when the weather warms up. We could be facing one of the biggest mosquito, and arbovirus, seasons for many years.

## ENVIRONMENTAL CONDITIONS

### Rainfall

Rainfall across Australia for the week ending 23/Oct/2016 is depicted on the left and monthly rainfall deciles for September 2016 are on the right. Over the last week, there was moderate rainfall across most of the state, being heaviest along the ranges. Rainfall during September was very much above average to highest on record over the inland, with the coast experiencing average precipitation. Minimum temperatures for September were around normal, while maximum temperature were 3-4 degrees below average.



### Three Month Rainfall & Temperature Forecast

For October to December 2016, rainfall predictions for NSW are for above average precipitation for most of the state, with an increasing probability of above average in the southern regions, especially along the Murray. Maximum and minimum temperatures are expected to be below average across 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).

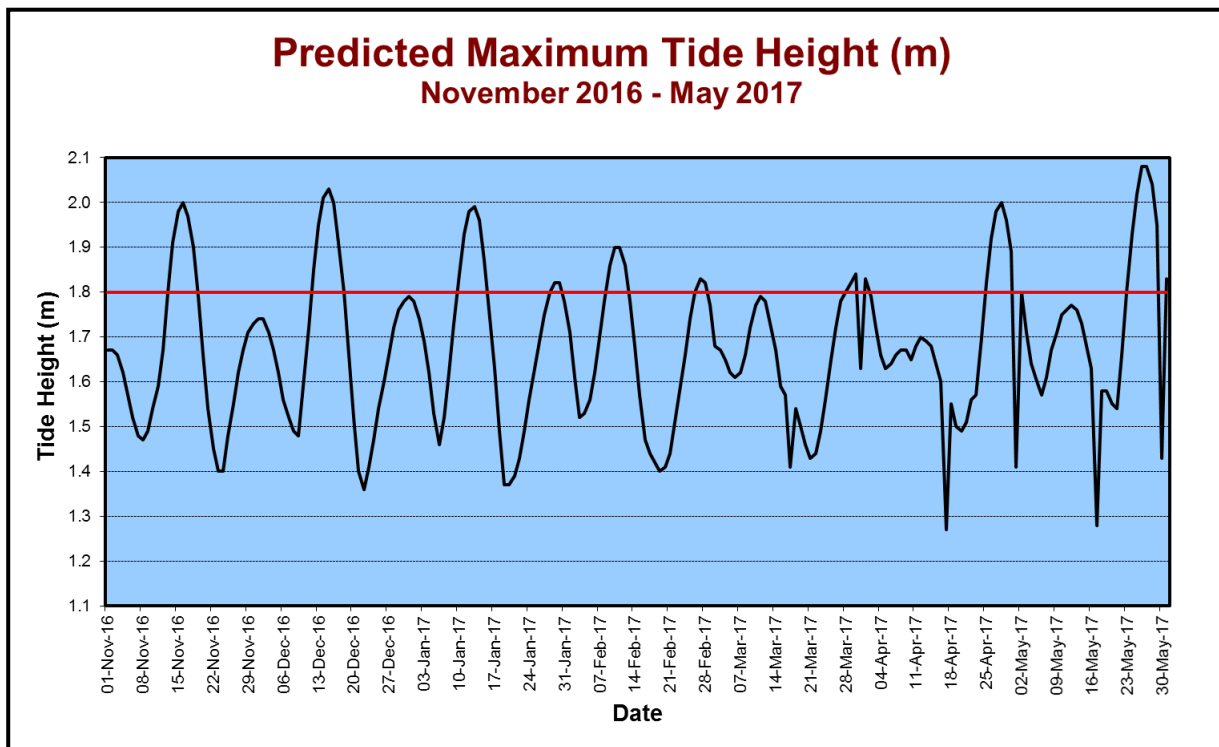
[www.bom.gov.au/climate/outlooks/#/temperature/summary](http://www.bom.gov.au/climate/outlooks/#/temperature/summary) (Max & min temperature outlook).

According to the BOM as of 11/Oct/16, the current tropical Pacific Ocean El Niño-Southern Oscillation remains neutral, with most models suggesting this is unlikely to change to the end of the 2016-17 summer. The Indian Ocean Dipole (IOD) has been negative but is expected to ease back to neutral by the end of spring. Spring in eastern Australia is typically wetter than average during a negative IOD or La Niña.

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 13-19/Nov/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.

## 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 2015 or the majority of the catchments for the first quarter of 2016 (Table 1). No data is presently yet available for the Oct-Dec 2016 and Jan-Mar 2017 periods.

**Table 1.** Rainfall indices for the main catchment basins of eastern Australia as per Forbes' hypothesis, relevant to the 2016-2017 season. Note that a value of 1 equals Decile 7 rainfall.

Catchment Basin	Oct-Dec 2015	Jan-Mar 2016	Oct-Dec 2016	Jan-Mar 2017
Darling River	0.72	0.67		
Lachlan/Murrumbidgee/Murray Rivers	0.70	1.14		
Northern Rivers	1.35	0.57		
North Lake Eyre system	1.35	0.63		

### ii. Nichol's Hypothesis

**Table 2.** The seasonal atmospheric pressures (in mm) according to Nichol's hypothesis, relevant to the 2016-2017 season (\*data for Sep/16 only).

	Autumn 2016	Winter 2016	Spring 2016*
2015 Value	1010.30	1012.57	1011
Pre past MVEV seasons	<1009.74	<1012.99	<1009.99

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

## ARBOVIRAL ISOLATES

LOCATION - Site	Date Trapped	Mosquito Species	Virus

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

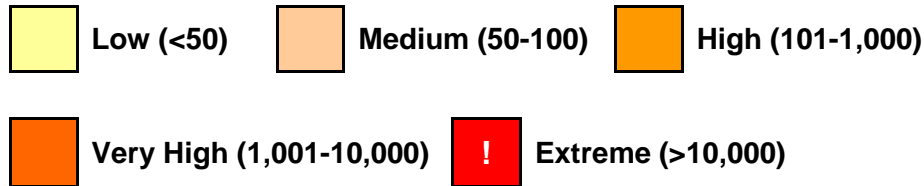
<http://medent.usyd.edu.au/arbovirus/results/virusisolates.htm>



## 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-16					Nov					Dec				Jan-17					Feb				Mar			
		2	9	16	23	30	6	13	20	27	4	11	18	22	1	8	15	22	29	5	12	19	26	5	12	19	26	
<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-17					Feb				Mar				Apr				
		6	13	20	27	4	11	18	22	1	8	15	22	29	5	12	19	26	5	12	19	26	2	9	16	23	30
<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-17					Feb				Mar				Apr				
		6	13	20	27	4	11	18	22	1	8	15	22	29	5	12	19	26	5	12	19	26	2	9	16	23	30
<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-16					Nov				Dec				Jan-17					Feb				Mar							
	2	9	16	8	8	8	13	20	27	4	11	18	22	1	8	15	22	29	5	12	19	26	5	12	19	26				
<a href="#">Bourke</a>																														
<a href="#">Deniliquin</a>																														
<a href="#">Forbes</a>																														
<a href="#">Griffith</a>																														
<a href="#">Hay</a>																														
<a href="#">Leeton</a>																														
<a href="#">Macquarie Marshes</a>																														
<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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