

NSW ARBOVIRUS SURVEILLANCE & MOSQUITO MONITORING PROGRAM 2017-2018

Weekly Update

Date: 17/Nov/2017

Summary

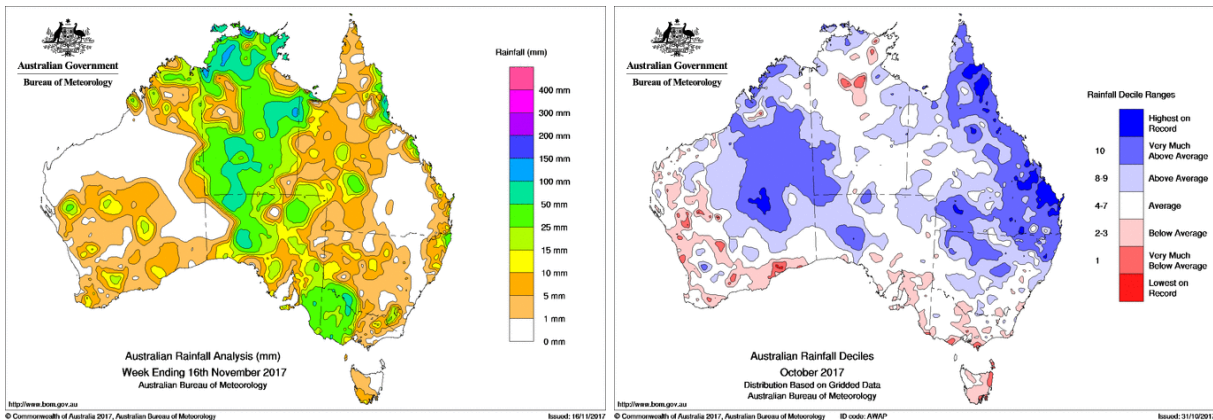
- **Climate:** over the last week, there was light rainfall for most of the state. For October, rainfall was average to above average for the southern parts of the state, while northern areas had very much above average rainfall. Note that rainfall during September was very much below average for the entire state with some of the driest conditions on record for the inland.
- **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 below average in the north east. Maximum and minimum temperatures are expected to be above average for all the state. According to the BOM as of 8/Nov/17, the La Niña watch continues, 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 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'.
- **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 181 RRV and 26 BFV notifications, this is around average for recent years.

Comment: numbers for the first three weeks of the 2016-2017 season = 36,305 mosquitoes. Numbers for the first three weeks of the 2017-2018 season = 312 mosquitoes. I will wake you if something happens! (Note that we will keep a continuing watch on rainfall patterns, tidal data, and the possible formation of a La Niña).

ENVIRONMENTAL CONDITIONS

Rainfall

Rainfall across Australia for the week ending 16/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 for most of the state. For October, rainfall was average to above average for the southern parts of the state, while northern areas had very much above average rainfall. Note that rainfall during September was very much below average for the entire state with some of the driest conditions on record for the inland. 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.



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 below average in the north east. Maximum and minimum temperatures are expected to be above average for all the state. The following pages contain graphics of the seasonal outlook:

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

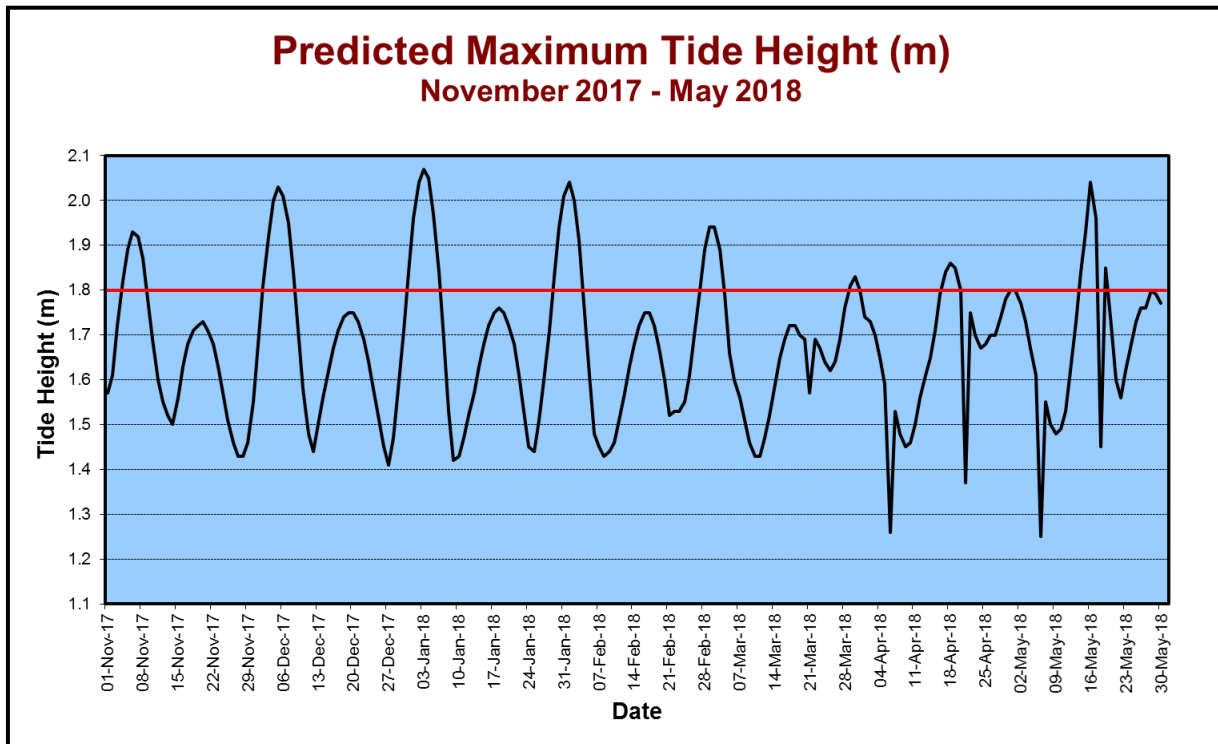
www.bom.gov.au/climate/outlooks/#/temperature/summary (Max & min temperature outlook).

According to the BOM as of 8/Nov/17, the La Niña watch continues, 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/ 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>

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

Notifications of Mosquito-Borne Disease in NSW, 2017-2018*

Week Ending	RRV	BFV	DENV [†]	Malaria [†]	CHIKV [†]	ZIKV [†]	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	4	2	5	0	0	0	11
Total	181	30	67	30	14	1	323

[†]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*.

Year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
2013-2014	36	23	27	36	30	30	33	35	44	72	86	57	509
2014-2015	38	50	46	67	59	90	117	305	431	264	102	50	1,619
2015-2016	54	61	53	61	70	54	42	60	78	79	52	16	680
2016-2017	12	11	20	17	38	216	429	274	200	142	174	89	1,622
2017-2018	30	40	53	52	6								181

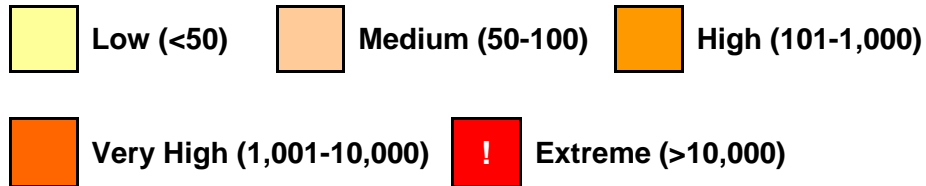
*updated 16/Nov/2017 (this table is updated more regularly than Table 5 above, hence there maybe differences in the numbers). Table modified from:

<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
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				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
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.																										
Port Macquarie	<i>Ae. vigilax</i>																										
	Total Mosq.																										
Tweed	<i>Ae. vigilax</i>																										
	Total Mosq.																										
Wyong	<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
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.																										
Hills Shire	<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	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	
Bourke																											
Deniliquin						15N																					
Dubbo						15N																					
Forbes						15N																					
Griffith					15N	15N																					
Hay					15N																						
Leeton						15N																					
Macquarie Marshes																											
Menindee																											
Moama																											
Moree																											
Wee Waa																											

N= Negative for MVEV & KUNV

Prepared by: Stephen Doggett, Senior Hospital Scientist, Department of Medical Entomology, NSW Health Pathology (ICPMR), Westmead Hospital NSW 2145. Email: Stephen.Doggett@health.nsw.gov.au

Please note that these results remain the property of the NSW Ministry of Health and may not be used or disseminated to unauthorised persons or organizations without permission.