

NSW ARBOVIRUS SURVEILLANCE & MOSQUITO MONITORING PROGRAM 2015-2016

Weekly Update

Date: 27/Nov/2015

SUMMARY

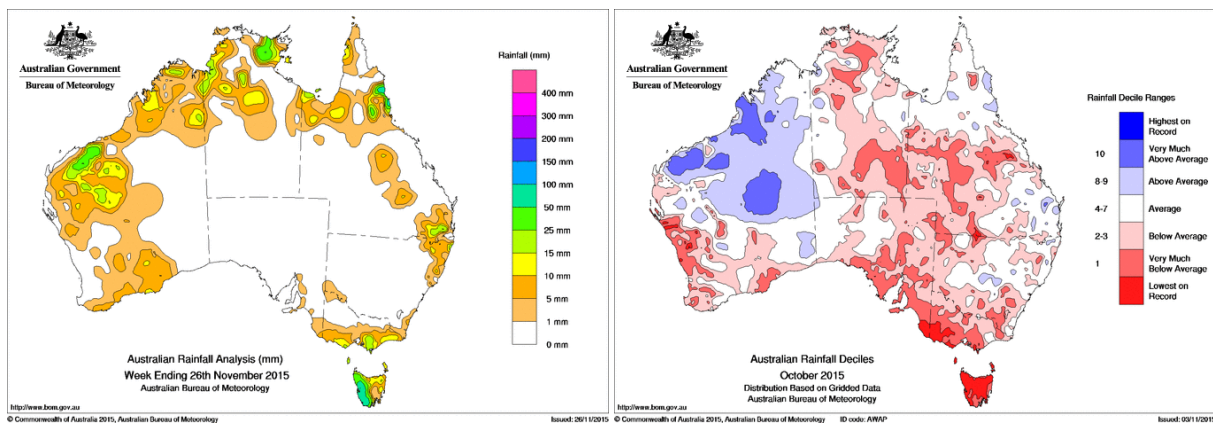
- **Climate:** over the last week, only the far north coast had any rainfall and this was very light.
- **Three Month Forecast:** for December 2015 to February 2016, rainfall predictions for NSW are for average rainfall for most of the state, with above average for the north coast. According to the BOM as of 24/Nov/15, the current El Niño episode is expected to persist until the end of the year and then ease during the first quarter of 2016.
- **Tidal:** the current set of high tides have been above the predicted heights and are likely to trigger mass hatching of *Aedes vigilax*, producing increased vector populations next week. The next series of high tides that may result in *Aedes vigilax* hatching are due to occur over 11-15/Dec/15.
- **MVEV models:** the data relevant to both the Forbes' and Nichols' hypotheses have been updated to Oct 2015 and both theories remain inconsistent with past MVEV outbreaks.
- **Mosquito Numbers Inland:** mosquito numbers are starting to creep up, with 'high' collections from both Griffith and Macquarie Marshes although numbers are close to the long term average.
- **Mosquito Numbers Coast:** surveillance activities are due to begin next week in December.
- **Mosquito Numbers Sydney:** surveillance activities are due to begin next week in December.
- **Arboviral Isolates:** there were no arboviral detections in the mosquitoes.
- **Chicken Sentinel Seroconversions:** no report has been issued this season by the serology laboratory.
- **Human Notifications:** for the current fiscal year, there have been 317 RRV and 39 BFV notifications.

Comment: mosquito populations continue to increase from the inland, although collections are close to average. *Culex annulirostris* numbers have only just started to increase. This week there has been some big tides, which should initiate *Aedes vigilax* hatching and adult emergence in the upcoming week. In contrast to many mosquitoes, the dry conditions induced by an El Niño can be favourable for *Aedes vigilax* production. Thus it is likely we will see much bigger numbers of this species this season.

ENVIRONMENTAL CONDITIONS

Rainfall

Rainfall across Australia for the week ending 26/Nov/2015 is depicted on the left and monthly rainfall deciles for October 2015 are on the right. Over the last week, only the far north coast had any rainfall and this was very light. For October, rainfall was above to very much above average. Maximum and minimum temperatures for April were 2-3 degrees below average.



Three Month Rainfall & Temperature Forecast

For December 2015 to February 2016, rainfall predictions for NSW are for average rainfall for most of the state, with above average for the north coast. Minimum temperatures are expected to be above normal for the coast and northwest of the state, especially in the southeast, while maximum temperatures are expected to be above average for the south coast and state northwest. The following pages contain graphics of the seasonal outlook:

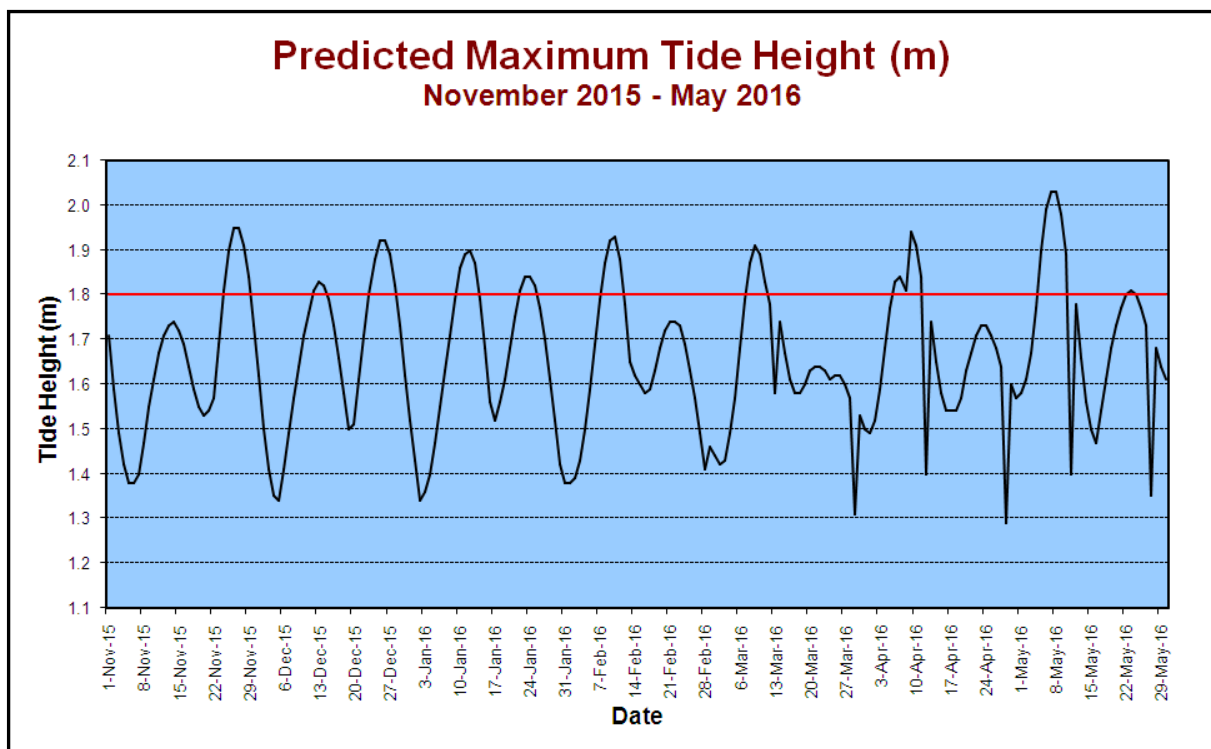
www.bom.gov.au/climate/outlooks/#/rainfall/median (Rainfall outlook).

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

According to the BOM as of 24/Nov/15, the current El Niño is comparable to record events of 1997-98 and 1982-83. The forecast is still that the El Niño continue until the end of the year, before declining during the first 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/

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 current set of high tides at Homebush have well surpassed predicted levels at Homebush Bay, which will prompt an aerial treatment in the next few days (C. Webb, *pers. comm.*). Adult emergence is expected to begin to occur during the middle of next week.

The next series of high tides that may result in *Aedes vigilax* hatching are due to occur over 11-15/Dec/15, however these are predicted to be not very high. A higher and longer set of spring tides are predicted to occur over 23-28/Dec/15.

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 so far, has been well below 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	0.48	
Lachlan/Murrumbidgee/Murray Rivers	0.97	1.05	0.29	
Northern Rivers	0.94	0.67	0.33	
North Lake Eyre system	1.07	0.67	0.11	

*data for October 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	1013.85
Pre past MVEV seasons	<1009.74	<1012.99	<1009.99

*data for September and October only.

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:

<http://www.health.nsw.gov.au/Infectious/reports/Pages/Communicable-Diseases-Weekly-Report.aspx>

Notifications of Mosquito-Borne Disease in NSW, 2015-2016

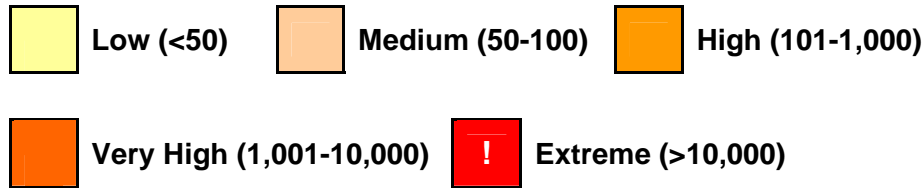
Week Ending	RRV	BFV	DENV	Malaria	CHIKV	Total
5-Jul-15	14	4	5	2	0	25
12-Jul-15	13	3	2	0	1	19
19-Jul-15	7	0	4	1	0	12
26-Jul-15	19	0	3	0	0	22
2-Aug-15	21	2	4	1	0	28
9-Aug-15	12	3	1	0	0	16
16-Aug-15	16	3	4	2	1	26
23-Aug-15	12	1	2	2	0	17
30-Aug-15	27	2	5	2	0	36
6-Sep-15	8	3	6	1	0	18
13-Sep-15	12	0	3	0	1	16
20-Sep-15	24	5	1	0	0	30
27-Sep-15	11	0	1	1	0	13
4-Oct-15	16	2	1	0	0	19
11-Oct-15	11	2	4	0	0	17
18-Oct-15	17	1	5	0	0	23
25-Oct-15	19	2	4	1	0	26
1-Nov-15	16	2	5	1	0	24
8-Nov-15	17	2	6	2	0	27
15-Nov-15	25	2	3	1	0	31
23-Nov-15						
Total	317	39	69	17	3	445

Comment: last season saw the largest outbreak of RRV since notifications began to be reported on a routine basis in 1985. The high number of RRV notifications during the winter months of this year makes no epidemiological sense as vector numbers are low and the risk of acquiring the virus is small. These reports are highly unlikely to represent recent infections (recent as in the previous week) and could relate to delays in notifications, past infections as IgM can persist for long periods, or errors in the serological testing.

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
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-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	
Ballina	<i>Cx. annul</i>																											
	Total Mosq.																											
Coffs Harbour	<i>Cx. annul</i>																											
	Total Mosq.																											
Gosford	<i>Cx. annul</i>																											
	Total Mosq.																											
Lake Macquarie	<i>Cx. annul</i>																											
	Total Mosq.																											
Nambucca	<i>Cx. annul</i>																											
	Total Mosq.																											
Port Macquarie	<i>Cx. annul</i>																											
	Total Mosq.																											
Shoal-haven	<i>Cx. annul</i>																											
	Total Mosq.																											
Tweed	<i>Cx. annul</i>																											
	Total Mosq.																											
Wyong	<i>Cx. annul</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	
Banks-town	<i>Cx. annul</i>																											
	Total Mosq.																											
Blacktown	<i>Cx. annul</i>																											
	Total Mosq.																											
Georges River	<i>Cx. annul</i>																											
	Total Mosq.																											
Hawkes-bury	<i>Cx. annul</i>																											
	Total Mosq.																											
Penrith	<i>Cx. annul</i>																											
	Total Mosq.																											
Sydney Olympic Park	<i>Cx. annul</i>																											
	Total Mosq.																											
Ryde	<i>Cx. annul</i>																											
	Total Mosq.																											

Sentinel Chicken Seroconversions

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				
Bourke																														
Deniliquin																														
Forbes																														
Griffith																														
Hay																														
Leeton																														
Macquarie Marshes																														
Menindee																														
Moama																														
Moree																														
Wee Waa																														

N= Negative for MVEV & KUNV

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