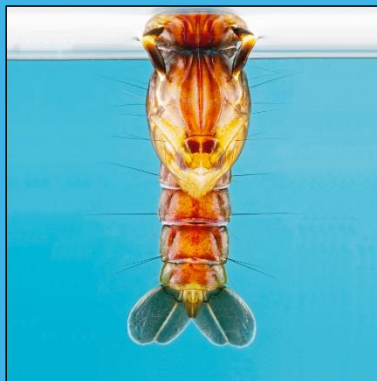


NSW Arbovirus Surveillance & Mosquito Monitoring Program, 2017-2018

Weekly Update: 23/Feb/2018



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Summary

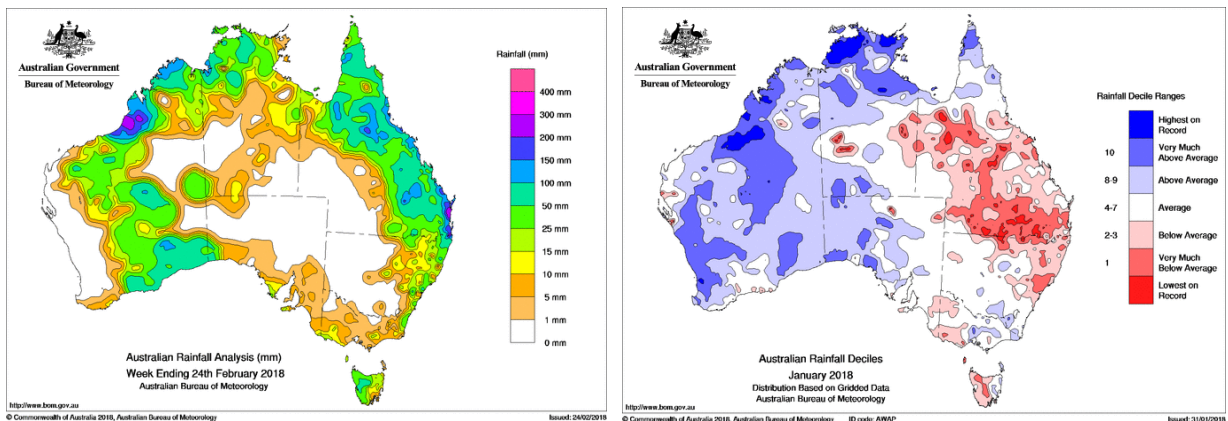
- **Climate:** over the last week, there was light to moderate rainfall along the coast and ranges, being heavier on the north coast. For January, rainfall was below average for the north east of the state and average elsewhere.
- **Three Month Forecast:** for March to May 2018, rainfall predictions for NSW are for average precipitation for most of the state, with a slight chance of exceeding the average along the coast and being below average in the far west. Maximum and minimum temperatures are expected to be around average, but above average in the west of the state. According to the BOM as 13/Feb/2018, the weak La Niña continues to decline and will end in autumn, hence the drier conditions of late.
- **Tidal:** the next series of high tides that may trigger *Aedes vigilax* hatching are due over 27/Feb to 4/Mar, with heights of 1.94m being predicted.
- **MVEV models:** the data relevant to both the Forbes' and Nichols' hypotheses have been updated to the end of Jan 2018. Both models are not suggestive of an MVEV epidemic.
- **Mosquito Numbers Inland:** mosquito numbers continue to decline and are lower than average, in spite of the 'high' numbers at Griffith and Leeton.
- **Mosquito Numbers Coast:** collections were 'high' at several sites, include all those from the mid-north coast and north. The Lennox Head site at Ballina trapped over 1,000 mosquitoes dominated by *Culex sitiens* (not a great human biter).
- **Mosquito Numbers Sydney:** for most sites, numbers were 'low' this week. The exceptions continue to be the sites along the Georges River and at Homebush, where *Aedes vigilax* dominates.
- **Arboviral Isolates:** there were no further arboviral detections from the mosquitoes.
- **Chicken Sentinel Flocks:** there have been no seroconversions.
- **Human Notifications:** for the current fiscal year, there have been 277 RRV and 56 BFV notifications, this is well below the average compared with recent years (the averages to the end of January are 464RRV and 43BFV).

Comment: the quite arboviral season continues. Mosquito numbers from the inland continue to be well below average and are unlikely to increase this season in light of the dry weather forecasted ahead. Collections from the coast have been notably higher, although there is presently little arboviral activity, with no detections from this region and human cases being well below average.

Environmental Conditions

Rainfall

Rainfall across Australia for the week ending 24/Feb/2018 is depicted on the left and monthly rainfall deciles for January 2018 are on the right. Over the last week, there was light to moderate rainfall along the coast and ranges, being heavier on the north coast. For January, rainfall was below average for the north east of the state and average elsewhere. Maximum and minimum temperatures for January were well above average; up to five degrees higher than normal in the west of the state.



Three Month Rainfall & Temperature Forecast

For March to May 2018, rainfall predictions for NSW are for average precipitation for most of the state, with a slight chance of exceeding the average along the coast and being below average in the far west. Maximum and minimum temperatures are expected to be around average, but above average in the west of the state. The following pages contain graphics of the seasonal outlook:

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

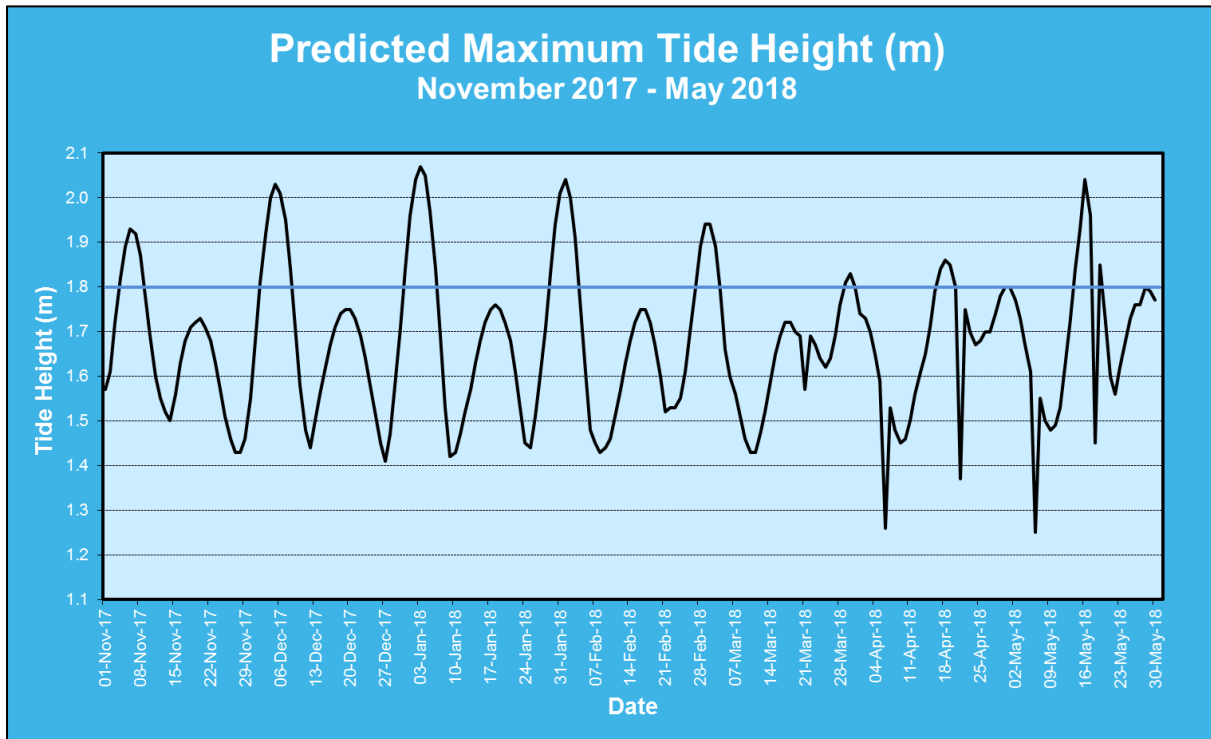
www.bom.gov.au/climate/outlooks/#/temperature/summary (Max & min temperature outlook).

According to the BOM as of 13/Feb/2018, the weak La Niña continues to decline and will end in autumn. The Indian Ocean Dipole (IOD) remains neutral. This all suggests that rainfall patterns are likely to return to normal in 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, as measured at Sydney, 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. Note this height varies between regions, thus at Batemans Bay, a tide height over 0.8m can trigger egg hatching.



The next series of high tides that may trigger *Aedes vigilax* hatching are due over 27/Feb to 4/Mar, with heights of 1.94m being predicted.

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. Climate change will also result in much higher tide heights. 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 localized 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, rainfall was above Decile 7 in only 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	0.93	0.32
Lachlan/Murrumbidgee/Murray Rivers	0.92	1.01	1.15	3.00
Northern Rivers	0.98	1.03	0.81	1.29
North Lake Eyre system	1.09	0.73	0.75	0.47

*January data only

ii. Nichol's Hypothesis

Table 2. The seasonal atmospheric pressures (in mm) according to Nichol's hypothesis, relevant to the 2017-2018 season.

	Autumn 2017	Winter 2017	Spring 2017
2017 Value	1009.60	1013.23	1009.70
Pre past MVEV seasons	<1009.74	<1012.99	<1009.99

Only the Winter period pertaining to the Nichol's hypothesis is not in line with past MVEV active years.

Arboviral Isolates

LOCATION - Site	Date Trapped	Mosquito Species	Virus
GRIFFITH – Lake Wyangan	3/Jan/2018	<i>Culex annulirostris</i>	Ross River
GRIFFITH – Lake Wyangan	31/Jan/2018	<i>Culex annulirostris</i>	Ross River
GRIFFITH – Hanwood	5/Feb/2018	<i>Culex annulirostris</i>	Ross River

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

Human Notifications

Weekly notifications of human mosquito-borne diseases infections are available from the NSW Ministry of Health, Communicable Disease Weekly Report and summarized in the Table below* (www.health.nsw.gov.au/Infectious/reports/Pages/CDWR.aspx).

Table 4. 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	5	2	7	0	0	0	14
18-Nov-17	3	2	10	0	0	0	15
25-Nov-17	9	2	6	1	1	0	19
2-Dec-17	14	1	8	0	0	0	23
9-Dec-17	9	0	3	1	0	0	13
16-Dec-17	9	4	2	1	2	0	18
23-Dec-17	7	0	6	0	0	0	13
30-Dec-17	5	0	1	0	0	0	6
Total	238	39	105	33	17	1	433

[†]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 5. Ross River virus infection notifications in NSW residents, by month of disease onset per fiscal year, July 2013 to February 2018*.

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	29	37	51	55	35	31	25	14					277
Ave [†]	36	37	37	46	51	101	156	169	188	140	107	55	1,121

*updated 23/Feb/2018 (this table is updated at different times to Table 4 above, hence there may be differences in the numbers).

[†]Average for 2013/14 to 2016/17.

Table modified from: <http://www1.health.nsw.gov.au/IDD/#/ROSS>

Table 6. Barmah Forest virus infection notifications in NSW residents, by month of disease onset per fiscal year, July 2014 to February 2018*.

Year	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
2014-2015	10	3	11	11	8	4	12	17	43	43	16	11	189
2015-2016	6	9	7	9	6	3	4	5	2	3	10	2	66
2016-2017	4	3	0	0	1	9	9	5	8	6	24	24	93
2017-2018	8	10	6	8	8	6	4	6					56
Ave [†]	7	5	6	7	5	5	8	9	18	17	17	12	116

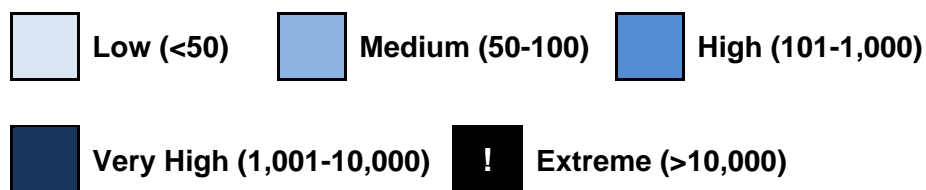
*updated 23/Feb/2018 (this table is updated at different times to Table 4 above, hence there may be differences in the numbers).

[†]Average for 2014/15 to 2016/17.

Table modified from: <http://www1.health.nsw.gov.au/IDD/#/BF>

Mosquito Results

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	24	31	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	10	17	24	31	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	10	17	24	31	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 Flocks

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	14N	15N	15N	15N	15N	15N	15N	15N	15N	14N	14N	15N	15N							
Dubbo						15N	15N	15N	15N	15N	14N	14N	14N	14N	14N	14N	14N	14N	14N	14N						
Forbes						15N		15N	15N	15N	14N							15N	15N							
Griffith					15N	15N	15N	15N	15N	15N	15N	15N		15N	15N	15N	15N	15N	15N							
Hay					15N	15N	15N	15N	15N	15N	15N			15N	15N	15N	15N	15N	15N							
Leeton						15N	15N		15N	15N	15N	15N	15N	15N	15N	14N	14N	14N	14N							
Macquarie Marshes							15N	15N	15N	15N	15N		15N	15N		15N	15N	15N								
Menindee										15N	15N	15N	15N	15N	15N	15N	15N	15N	14N	15N						
Moama																										
Moree										15N	15N		15N	15N	15N	15N	15N	15N	15N							
Wee Waa																										

N= Negative for MVEV & KUNV

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