NSW Health

NSW Arbovirus Surveillance Program Annual report

2022-2023

NSW GOVERNMENT

https://www.health.nsw.gov.au/environment/pests/vector/Pages/annual-report.aspx


NSW
GOVERNMENT

NSW Health acknowledges the traditional owners of the lands on which we work, live and play. We pay our respect to Elders past, present and emerging. This report was produced on the lands of the Burramattagal and Cammeraygal People of New South Wales. NSW Health also acknowledges all the lands across NSW on which mosquito trapping, sentinel chicken surveillance and other components of the Arbovirus Surveillance and Mosquito Monitoring Program are conducted. The knowledge, resilience and strength of Aboriginal Peoples is key to supporting health for Aboriginal communities.

Produced by:

The Department of Medical Entomology, NSW Health Pathology, at the Institute for Clinical Pathology and Medical Research, Westmead Hospital, in collaboration with the Environmental Health Branch, Health Protection NSW.

https://www.health.nsw.gov.au/environment/pests/vector/Pages/annual-report.aspx

SHPN: SHPN (EH NSW) 250001

ISBN: 978-1-74231-011-4 (online)

Suggested citation: NSW Arbovirus Surveillance and Mosquito Monitoring Program Annual Report: 2022-2023.

Contents

Background

The aim of the NSW Arbovirus Surveillance and Mosquito Monitoring Program (ASMMP) is to provide an early warning of increased arboviral risk by monitoring arboviral activity in sentinel chickens and mosquitoes. The ASMMP operates from spring to autumn each year, coinciding with the period during which mosquito and arbovirus activity is typically highest.

Sentinel chicken flocks in inland locations in NSW are tested for the presence of antibodies against flaviviruses of public health concern including Murray Valley encephalitis (MVEV), Kunjin (KUNV), and Japanese encephalitis viruses (JEV). Mosquito trapping occurs across NSW, and mosquitoes are tested for the presence of both flaviviruses and alphaviruses of public health concern including Ross River Virus (RRV) and Barmah Forest Virus (BFV).

For the purposes of the ASMMP, arbovirus activity in NSW is categorised into three broad virogeographical zones: inland, the tablelands, and the coastal strip including Sydney. Within these zones there are differences in the dynamics of environmental factors, mosquito vectors, viral reservoir hosts, and mosquito-borne viruses.

Executive summary

This report summarises mosquito trapping and sentinel chicken results in NSW for the 2022-2023 arbovirus season.

Two main models have been developed for the prediction of MVEV epidemic activity in south-eastern Australia: the Forbes' (1978) and Nicholls' (1986) hypotheses. According to Forbes' model, there was a high risk of an MVEV epidemic for the 2022-2023 season. The Nicholls' hypothesis uses the Southern Oscillation (SO) as a tool to indicate a possible MVEV epidemic. For 2023, the autumn, winter, and spring Nicholls' values, respectively, were 1008.80mm, 1012.33, and 1009.73. All these values were well inside the range of past MVEV epidemic years. Thus, both models were predicting an MVEV epidemic. This season was also the third consecutive La Niña year, which has historically resulted in above average rainfall and has always been associated with major MVEV outbreaks across southeastern Australia. With the emergence of Japanese encephalitis virus (JEV) in Australia in the preceding season (2021-2022), interactions and transmission dynamics between JEV and MVE (both flaviviruses) were not well understood going into the current season.

The extensive rainfall resulted in the largest total of mosquitoes collected for any season in the history of the program. Over 550,000 mosquitoes were trapped, with close to 400,000 from the inland alone. One trap in Griffith yielded 33,000 mosquitoes in one night. For the coast, the constant precipitation resulted in low collections of *Aedes vigilax*

The southeast of Australia experienced the largest and most widespread MVEV outbreak since 1974. In 2022-2023, there were 21 MVEV detections from mosquitoes and 45 seroconversions from sentinel chickens across 14 locations. Prior to the current season, there had not been any MVEV detections in mosquitoes since 2008 (4 detections). MVE had been detected in sentinel chickens in 2003-04 (11 seroconversions), 2005-06 (7 seroconversions), 2011-12 (5 seroconversions) and 2013-14 (one seroconversion). In the current season, the first detection was from mosquitoes trapped at Menindee on 4 January 2023 and the last from sentinel chickens bled on 14 April 2023 from Forbes.. Widespread MVEV activity was also reported from Victoria and South Australia.

There were 26 MVEV human notifications across Australia, which resulted in 8 deaths. Six cases were reported from NSW. RRV and BFV human notifications were lower than the 10-year average across all regions.

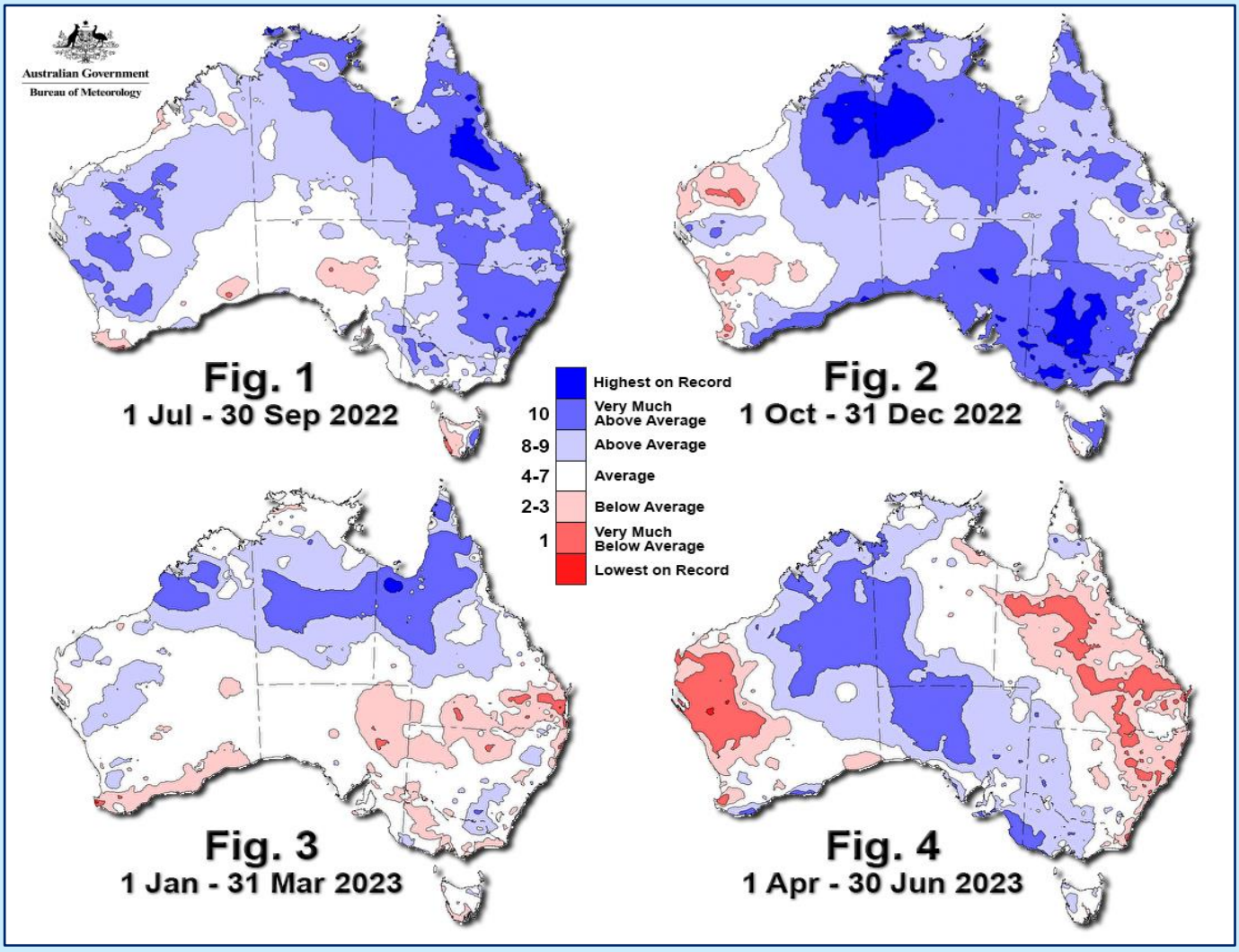
Weather data

Mosquitoes need water to breed. Mosquito abundance is therefore affected by rainfall patterns and irrigation practices in inland regions. In coastal regions, tidal inundation along with rainfall is important. Temperature and/or day-length are often critical in determining the start and duration of mosquito activity for species in temperate zones. Higher temperatures can amplify replication of the virus. Monitoring environmental parameters is therefore crucial.

Rainfall

Figures 1-4 provide an overview of Australian rainfall deciles for the 2022-2023 season. It is important to note that this was the third consecutive La Niña year. La Niña years are typically associated with above average rainfall.

Figures 1-4: Quarterly Rainfall Deciles, Australian Bureau of Meteorology



- **Figure 1: July 2022 to September 2022.** Rainfall was above average for most of NSW and very much above average for much of the coast, ranges and slopes district.
- **Figure 2: October 2022 to December 2022.** Rainfall was very much average for most of the state with record rainfall in the south-central inland. Only the north coast experienced average rainfall.
- **Figure 3: January 2023 to March 2023.** Rainfall was mostly average in NSW, with pockets of below

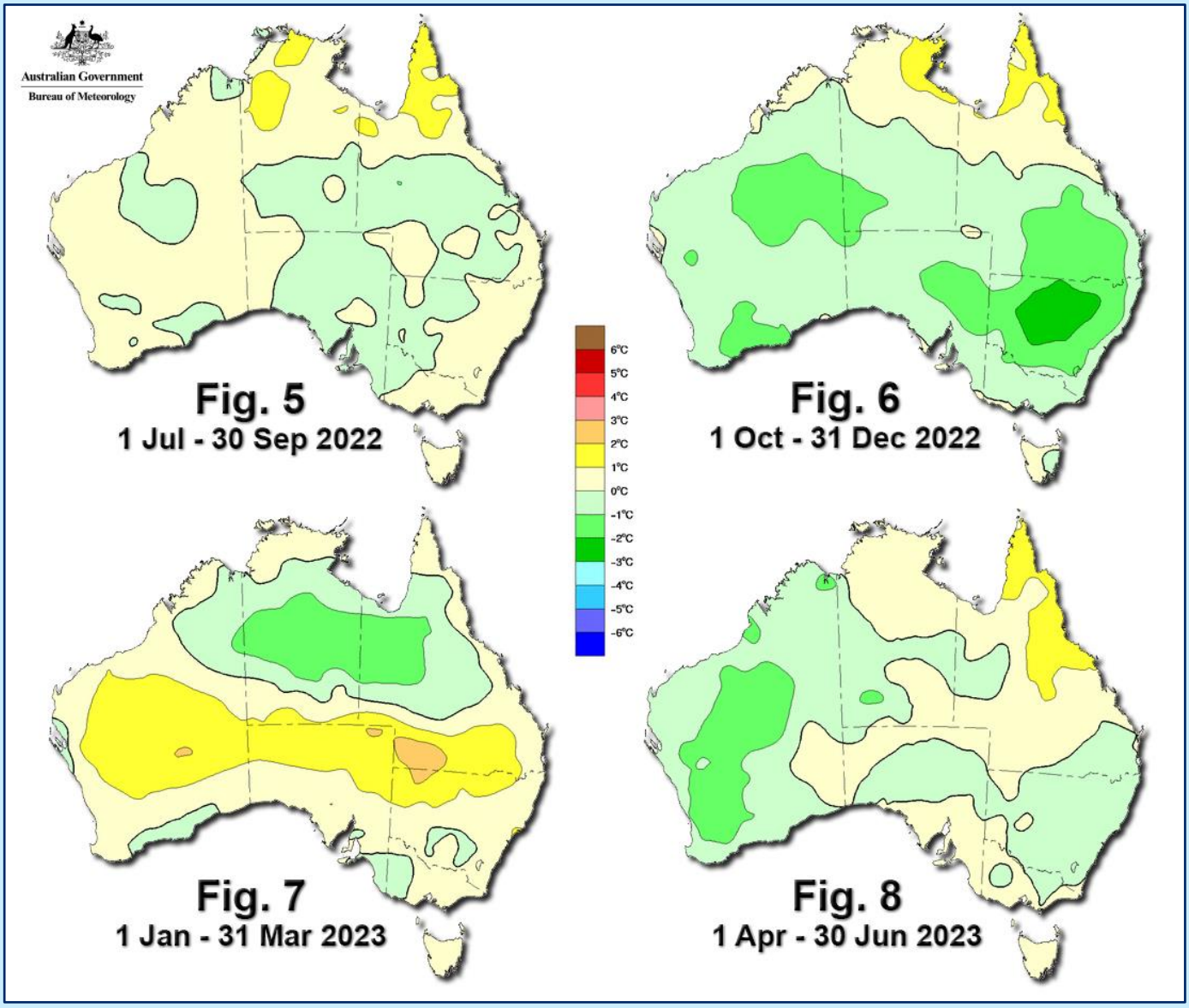
average rainfall in the northwest and north coast.

- **Figure 4: April 2023 to June 2023.** Rainfall was above average for the west of the state and below average along the coast.

Temperature

Figures 5-8 provide an overview of Australian temperature anomalies (departures from the normal) for the 2022-2023 season.

Figures 5-8: Quarterly Temperature Anomalies, Australian of Meteorology



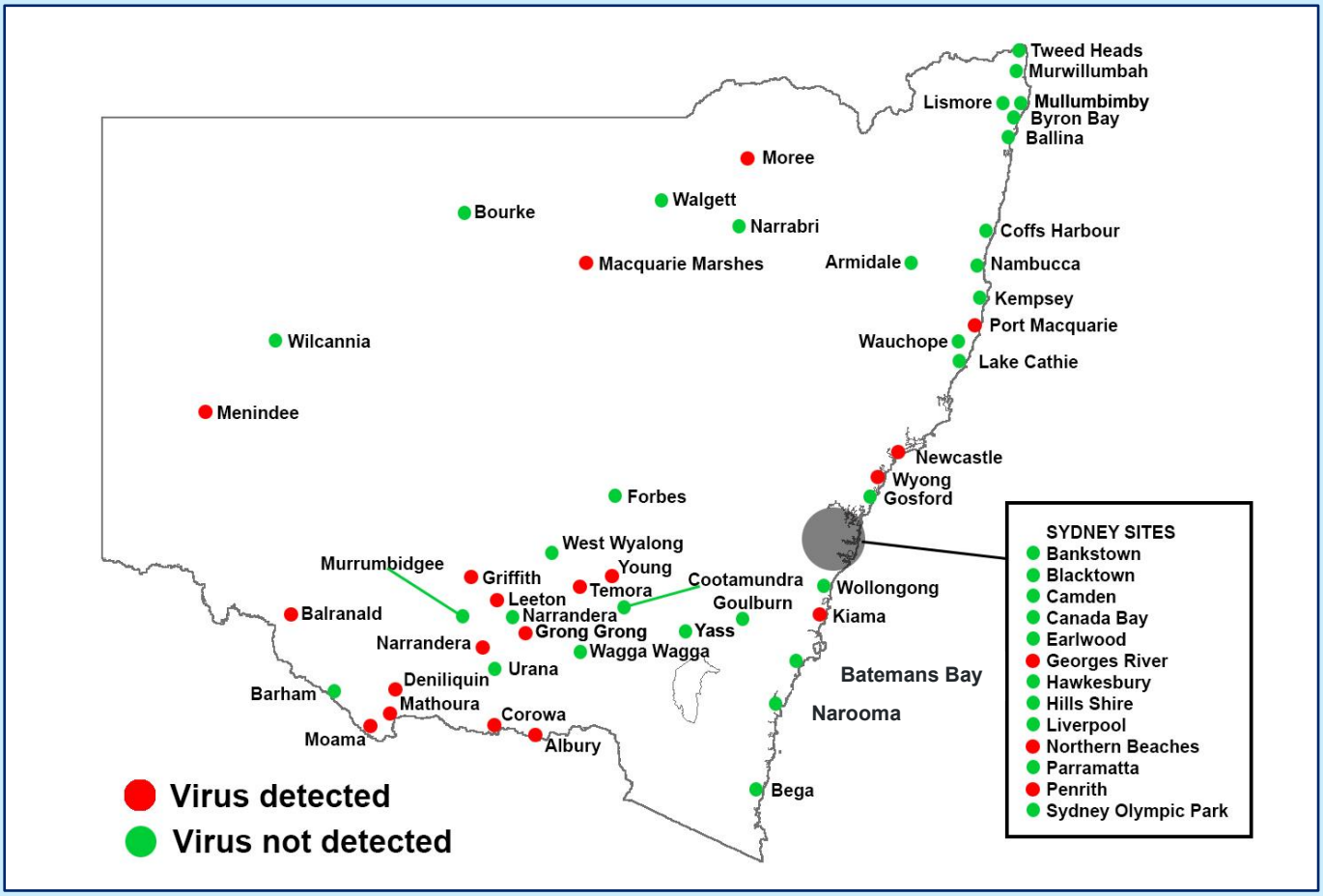
- **Figure 5: July 2022 to September 2022.** Temperatures were near average in NSW.
- **Figure 6: October 2022 to December 2022.** Temperatures were around 1-3°C below average for the entire state, with the central north being cooler than other areas.
- **Figure 7: January 2023 to March 2023.** Temperatures were mostly around average for the state, although the northwest was up to 2°C above average.
- **Figure 8: April 2023 to June 2023.** Temperatures were near average.

Mosquito trapping results

Mosquitoes are collected overnight in dry-ice baited Encephalitis Virus Surveillance type traps. They are then sent live in cool, humid Eskies via overnight couriers to the Department of Medical Entomology, NSW Health Pathology-Institute of Clinical Pathology and Medical Research for species identification and arbovirus isolation.

In 2022-2023, there were 113 mosquito trapping sites across 60 locations (Figure 9).

Figure 9: Mosquito trapping locations, NSW, 2022-2023



* For a comprehensive list of detected viruses in mosquitoes, please refer to Table 2.

Mosquito counts

There were 554,481 mosquitoes representing 68 species collected. *Culex annulirostris* was the most abundant and most important of the inland mosquito species during the summer months. *Aedes vigilax*, *Culex annulirostris, Culex sitiens,* and *Aedes notoscriptus* were the most numerous species on the coast. Table 1 provides a summary of results by virogeographical zones.

Table 1: Mosquito trapping results by virogeographical zone, NSW, 2022-2023

Virogeographical zone	Total counts	Species collected
Inland	395,047 mosquitoes	31 species collected with: *Anopheles annulipes* (41.0%) *Culex annulirostris* (29.6%) *Culex australicus* (21.8%)
Coastal	94,484 mosquitoes	60 species collected with: *Coquillettida linealis* (32.5%) *Aedes notoscriptus* (14.4%) *Aedes vigilax* (9.4%) *Culex sitiens* (7.5%) *Coquillettida xanthogaster* (6.3%) *Mansonia uniformis* (5.1%)
Metropolitan Sydney	64,950 mosquitoes	42 species collected with: *Aedes vigilax* (42.0%) *Aedes notoscriptus* (13.7%) *Anopheles annulipes* (8.5%) *Coquillettida linealis* (7.1%) *Culex australicus* (6.4%)

The below figures show mosquito trapping results by location and species type for the 2022-2023 arbovirus season. Mosquito abundances through the ASMMP are described and reported as:

- No collection
- 'low' (<50 per trap)
- 'moderate' (50 - 100 per trap)
- 'high (101 – 1,000 per trap)
- 'very high' (1,000 – 10,000 per trap)
- 'extreme' (>10,001 per trap)

Figure 10: Number of mosquitoes trapped from the inland region (weekly location average)

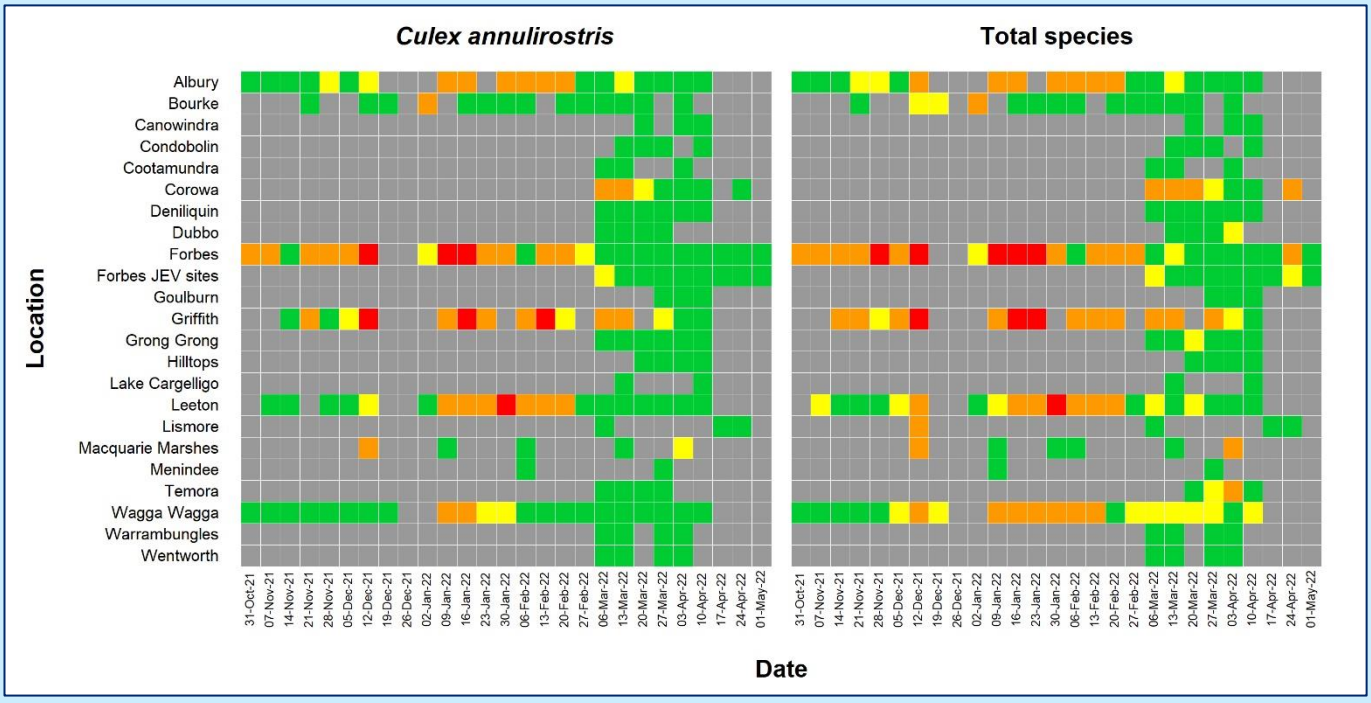


Figure 11: Number of mosquitoes trapped from the coastal region (weekly location average)

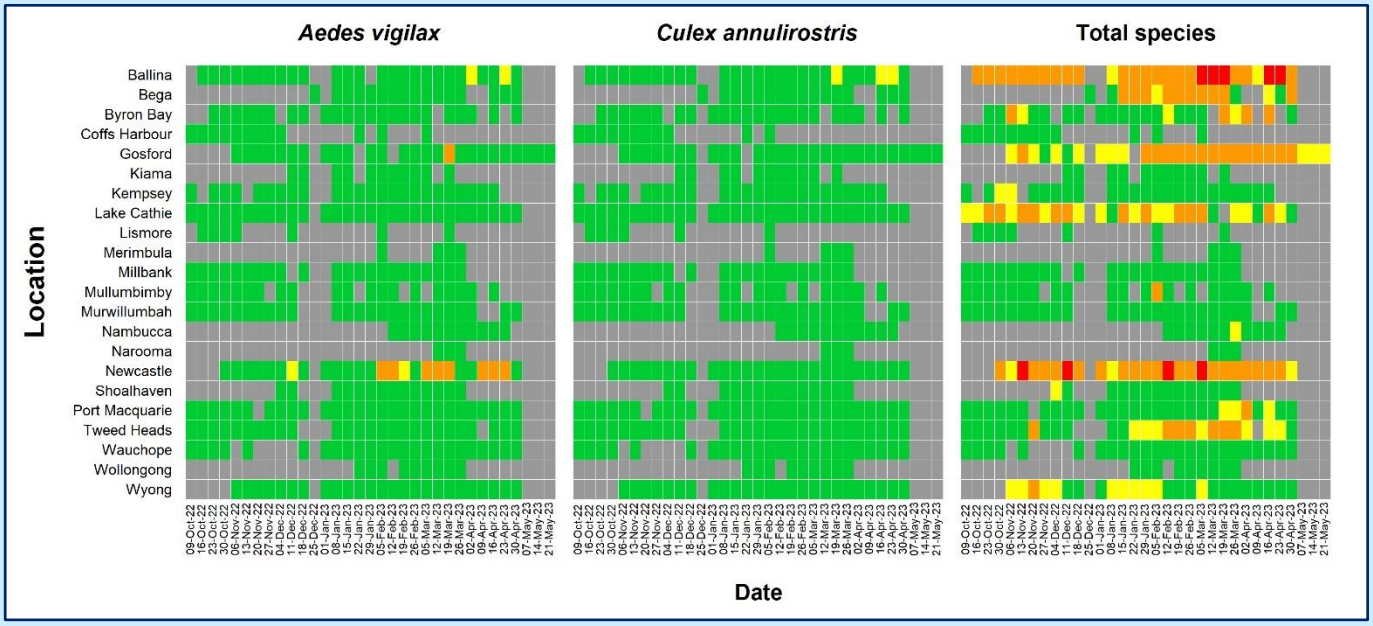
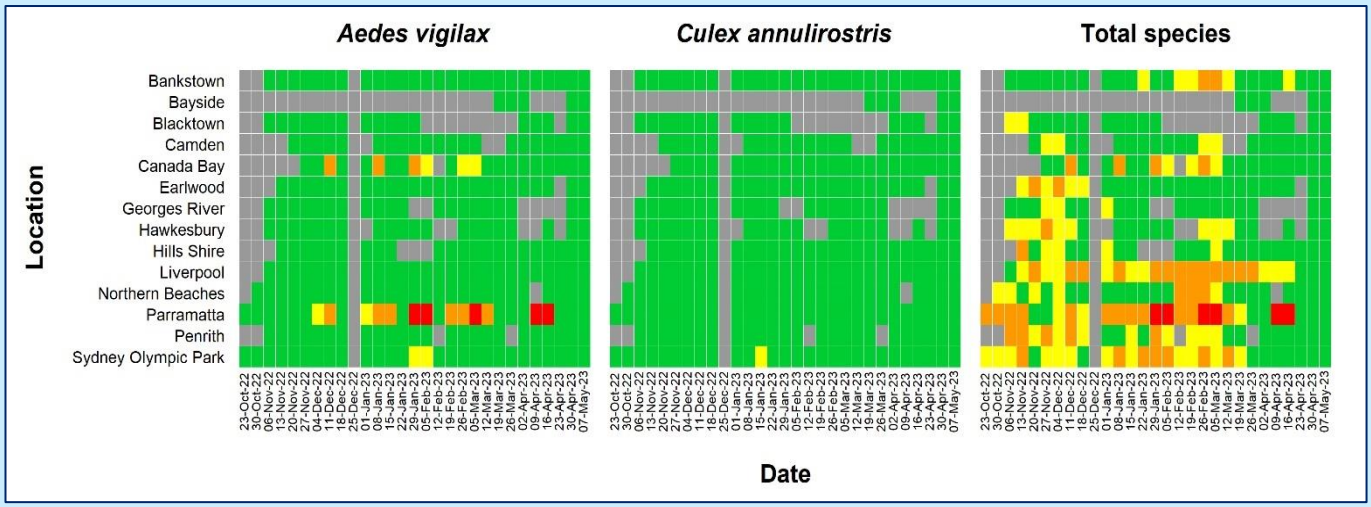


Figure 12: Number of mosquitoes trapped from the Sydney region (weekly location average)



Arboviral detections in mosquitoes

Viral detection in mosquitoes involves modern molecular techniques for identifying viral nucleic acid. From the mosquitoes processed, there were 50 detections including 10 Barmah Forest, 4 Ross River, 6 Edge Hill, 21 Murray Valley encephalitis, and 7 Stratford virus detections (Table 2). Of these, 38 were from the inland (8 Barmah Forest, 4 Ross River, 3 Edge Hill, 21 Murray Valley encephalitis and 2 Kunjin). Eight detections were from the coast (2 Barmah Forest, 2 Edge Hill and 4 Stratford) and 4 were from Sydney locations (1 Edge Hill and 3 Stratford).

Table 2: Arboviral detections in mosquitoes, NSW, 2022-2023

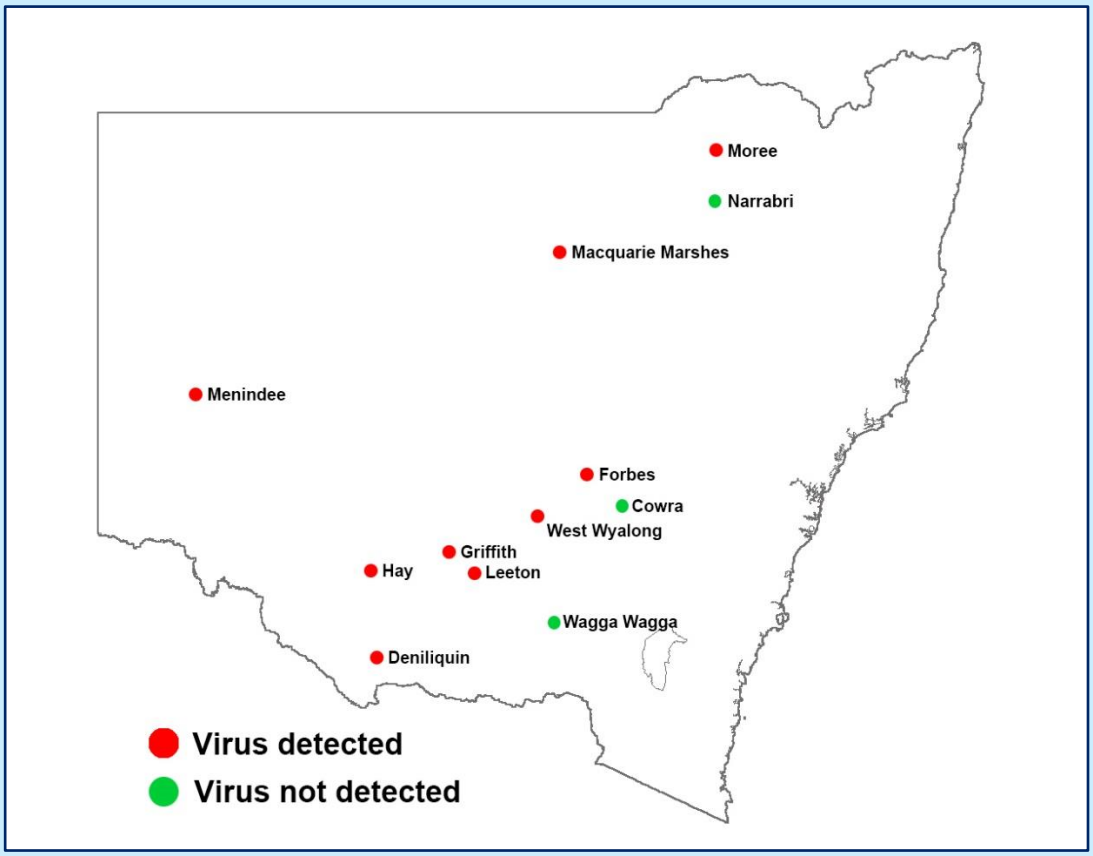
Location	Site	Date	Viruses detected
Albury	Kremur St	30 January 2023	Murray Valley encephalitis
Balranald	Court St	23 January 2023	Murray Valley encephalitis
Bankstown	Picnic Point	13 March 2023	Stratford
Corowa	Whitehead St	9 January 2023	Ross River, Edge Hill
Corowa	Whitehead St	13 February 2023	Murray Valley encephalitis
Corowa	Ball Park Caravan Park	20 February 2023	Murray Valley encephalitis
Deniliquin	River St	6 December 2022	Barmah Forest
Deniliquin	River St	21 February 2023	Murray Valley encephalitis
Gosford	Empire Bay	23 March 2023	Barmah Forest
Gosford	Empire Bay	2 May 2023	Barmah Forest
Griffith	Lake Wyangan	15 November 2023	Ross River
Griffith	Lake Wyangan	22 November 2023	Barmah Forest
Griffith	Lake Wyangan	6 December 2022	Barmah Forest
Griffith	Melville Cres	6 December 2022	Barmah Forest
Griffith	Lake Wyangan	10 January 2023	Murray Valley encephalitis
Griffith	Melville Cres	16 January 2023	Murray Valley encephalitis
Griffith	Lake Wyangan	16 January 2023	Murray Valley encephalitis
Griffith	Lake Wyangan	23 January 2023	Kunjin
Griffith	Melville Cres	6 February 2023	Murray Valley encephalitis
Grong Grong	River Road	6 December 2022	Edge Hill
Grong Grong	River Road	12 December 2022	Barmah Forest
Kiama	Gerroa WWTP	6 March 2023	Stratford
Leeton	Farm 269	5 December 2022	Barmah Forest
Leeton	Farm 269	31 January 2023	Murray Valley encephalitis
Macquarie Marshes	Bluelight 1	14 November 2023	Barmah Forest
Macquarie Marshes	Bluelight 2	23 January 2023	Murray Valley encephalitis
Macquarie Marshes	Bluelight 2	13 February 2023	Murray Valley encephalitis
Macquarie Marshes	Bluelight 1	13 March 2023	Murray Valley encephalitis
Mathoura	Mathoura 1	17 January 2023	Murray Valley encephalitis
Mathoura	Mathoura 1	30 January 2023	Murray Valley encephalitis
Menindee	Wilcannia Rd	4 January 2023	Murray Valley encephalitis
Menindee	Wilcannia Rd	10 January 2023	Murray Valley encephalitis (2)
Moama	Moama 2	17 January 2023	Murray Valley encephalitis
Moama	Barham Pound	17 January 2023	Murray Valley encephalitis

Moree	Wallanol Rd	19 February 2023	Edge Hill
Narrandera	STP	13 March 2023	Ross River
Newcastle	Maryland 3	3 April 2023	Edge Hill
Newcastle	Maryland 3	11 April 2023	Edge Hill
Northern Beaches	Warriewood	21 March 2023	Stratford
Penrith	Werrington	13 December 2022	Edge Hill
Penrith	Werrington	7 March 2023	Stratford
Temora	Trungley Rd	5 December 2022	Ross River
Temora	Trungley Rd	23 January 2023	Murray Valley encephalitis
Wyong	North Avoca	7 March 2023	Stratford
Young	Chillingworks Rd	9 March 2023	Barmah Forest

Sentinel chicken surveillance results

There was a total of 12 flocks with 15 chickens in each flock located across NSW (Figure 13). The first bleed of the season was on 9 October 2022 and the last on 24 April 2023..

Figure 13: Sentinel chicken surveillance sites, NSW, 2022-2023



A total of 3,935 blood samples were received from all of the flocks in NSW during the season and tested for flaviviruses of public health concern. There were 45 Murray Valley encephalitis and 29 Kunjin seroconversions in the sentinel chickens (Table 3).

Table 3: Arboviral detections in sentinel chickens, NSW, 2022-2023*

Location	Date	Viruses detected (number of chickens)
Deniliquin	30 January 2023	Murray Valley encephalitis (1)
Deniliquin	12 February 2023	Murray Valley encephalitis (3)
Deniliquin	3 March 2023	Murray Valley encephalitis (1)
Deniliquin	12 March 2023	Kunjin (1)
Forbes	6 February 2023	Murray Valley encephalitis (1)
Forbes	14 February 2023	Murray Valley encephalitis (4)
Forbes	4 April 2023	Murray Valley encephalitis (1)
Forbes	14 April 2023	Murray Valley encephalitis (1)
Griffith	7 March 2023	Murray Valley encephalitis (2)
Griffith	3 April 2023	Kunjin (1)
Hay	6 February 2023	Murray Valley encephalitis (1)
Hay	21 February 2023	Murray Valley encephalitis (3)
Hay	20 March 2023	Murray Valley encephalitis (1), Kunjin (3)
Hay	2 April 2023	Kunjin (1)
Leeton	29 January 2023	Murray Valley encephalitis (1)
Leeton	12 February 2023	Murray Valley encephalitis (2), Kunjin (1)
Leeton	19 February 2023	Murray Valley encephalitis (2), Kunjin (1)
Leeton	13 March 2023	Kunjin (2)
Leeton	26 March 2023	Kunjin (1)
Macquarie Marshes	20 February 2023	Murray Valley encephalitis (8)
Macquarie Marshes	13 February 2023	Murray Valley encephalitis (2), Kunjin (1)
Macquarie Marshes	5 March 2023	Kunjin (1)
Macquarie Marshes	2 April 2023	Kunjin (4)
Menindee	12 February 2023	Murray Valley encephalitis (5), Kunjin (1)
Menindee	19 February 2023	Murray Valley encephalitis (1)
Menindee	26 February 2023	Murray Valley encephalitis (1)
Menindee	5 February 2023	Murray Valley encephalitis (4), Kunjin (3)
Menindee	12 March 2023	Kunjin (5)
Moree	13 March 2023	Murray Valley encephalitis (15)
West Wyalong	23 February 2023	Murray Valley encephalitis (1)
West Wyalong	5 April 2023	Kunjin (1)

Human notifications of locally acquired arbovirus infections

All arboviral infections detected in humans are notifiable under the *NSW Public Health Act 2010*. The two most common locally acquired arbovirus infections notified in NSW are infections with Ross River virus (RRV) and Barmah Forest virus (BFV).

In the 2022-2023 mosquito season year there were 111 notifications of BFV infection and 414 notifications of RRV in NSW residents (Table 4). BFV and RRV numbers were lower than the 10-year average (Figures 14 and 15).RRV and BFV notifications vary across Local Health Districts (LHDs) and virogeographic regions. The highest number of RRV notifications were reported in Hunter New England (104) and Murrumbidgee (93), both in the Inland region, while BFV notifications peaked in the Coastal region, particularly in the Mid North Coast (34) and Northern NSW (31) (Table 4).

In 2022-2023, four MVE cases were notified in residents of inland NSW (Figure 16). There were two human cases of JEV in 2022-2023 (Figure 17).

Figure 14: Barmah Forest virus notifications over the last 10 years (July 2013 to June 2023) compared to 10-year average, NSW

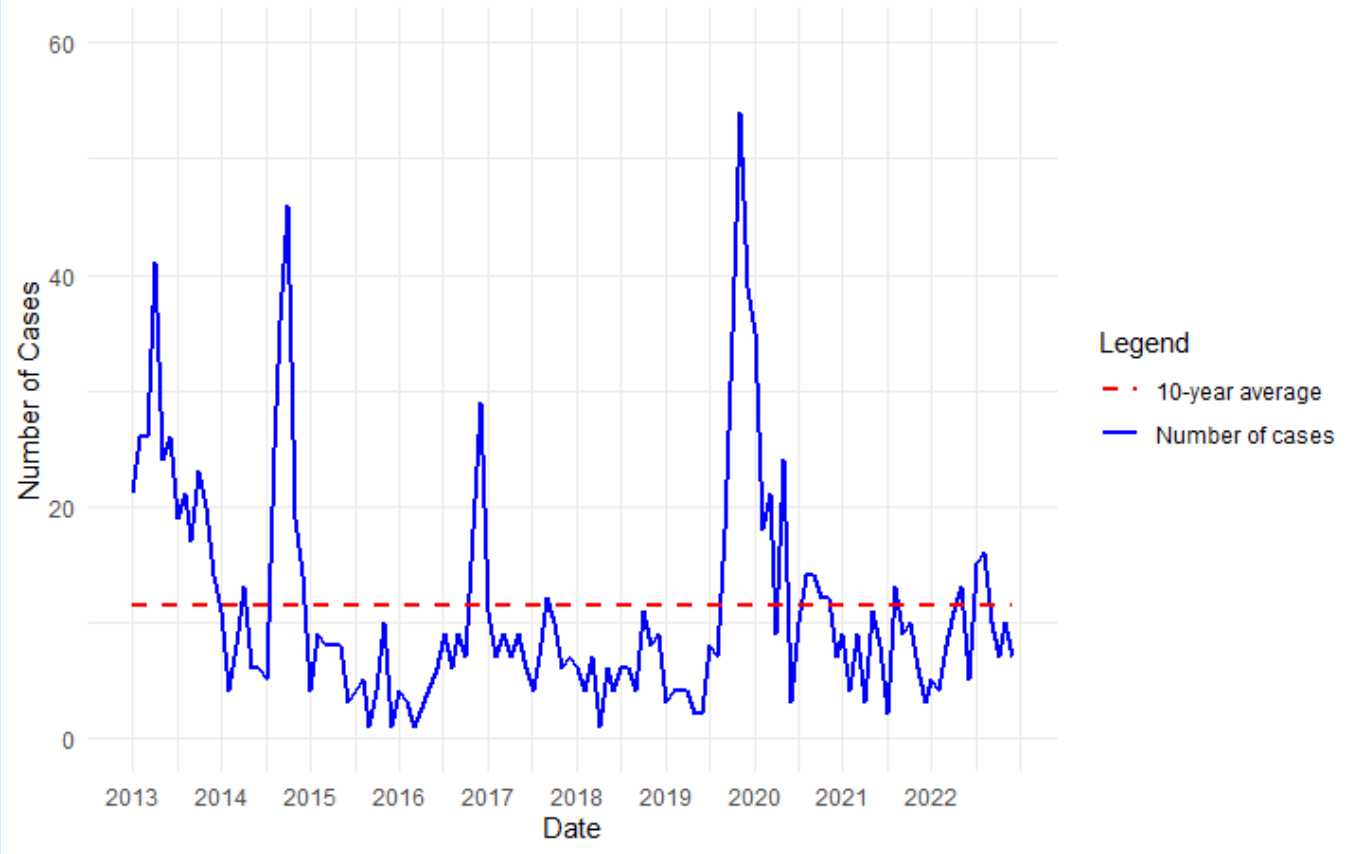


Figure 15: Ross River virus notifications over the last 10 years (July 2013 to June 2023) compared to 10-year average, NSW

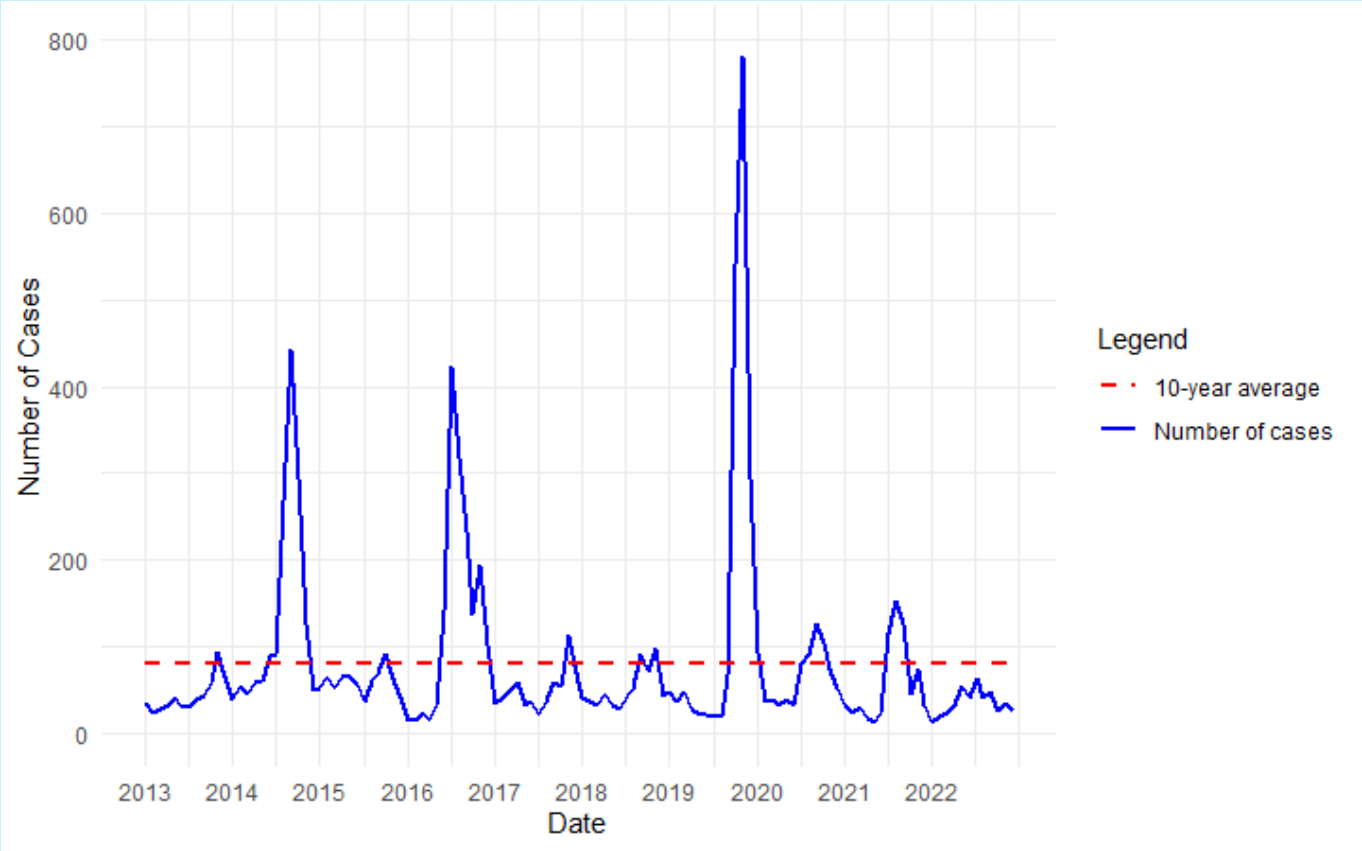


Table 4: Barmah Forest and Ross River virus human notifications in NSW by local health district and virogeographic region, 2022-2023

Local health district	Virogeographic region	Ross River virus notifications	Barmah Forest virus notifications
Hunter New England	Inland	104	23
Murrumbidgee	Inland	93	5
Western NSW	Inland	61	2
Northern NSW	Coastal	44	31
Mid North Coast	Coastal	33	34
Far West	Inland	20	1
Northern Sydney	Metropolitan Sydney	11	2
Southern NSW	Inland	11	5
Central Coast	Coastal	7	3
South Western Sydney	Metropolitan Sydney	7	1
Nepean Blue Mountains	Metropolitan Sydney	6	2
Western Sydney	Metropolitan Sydney	5	0
Illawarra Shoalhaven	Coastal	4	1
South Eastern Sydney	Metropolitan Sydney	4	0
Sydney	Metropolitan Sydney	3	0
Victoria		1	0
NSW not further specified		0	1
TOTAL	**ALL REGIONS**	**414**	**111**

* Human cases are assigned to LHDs based on the individual's residential address, not the location where the infection was acquired.

Figure 16: Murray Valley encephalitis virus notifications since July 2008, NSW

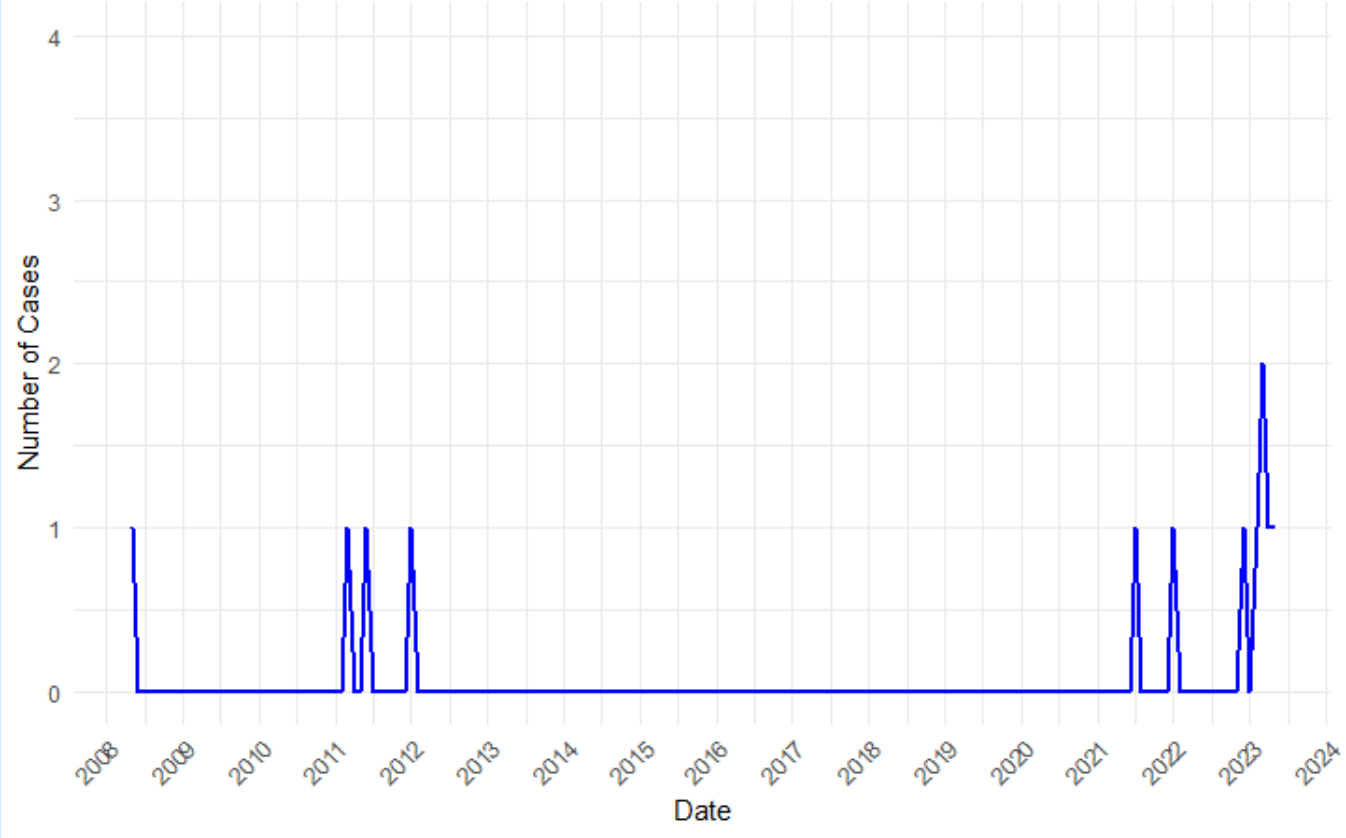
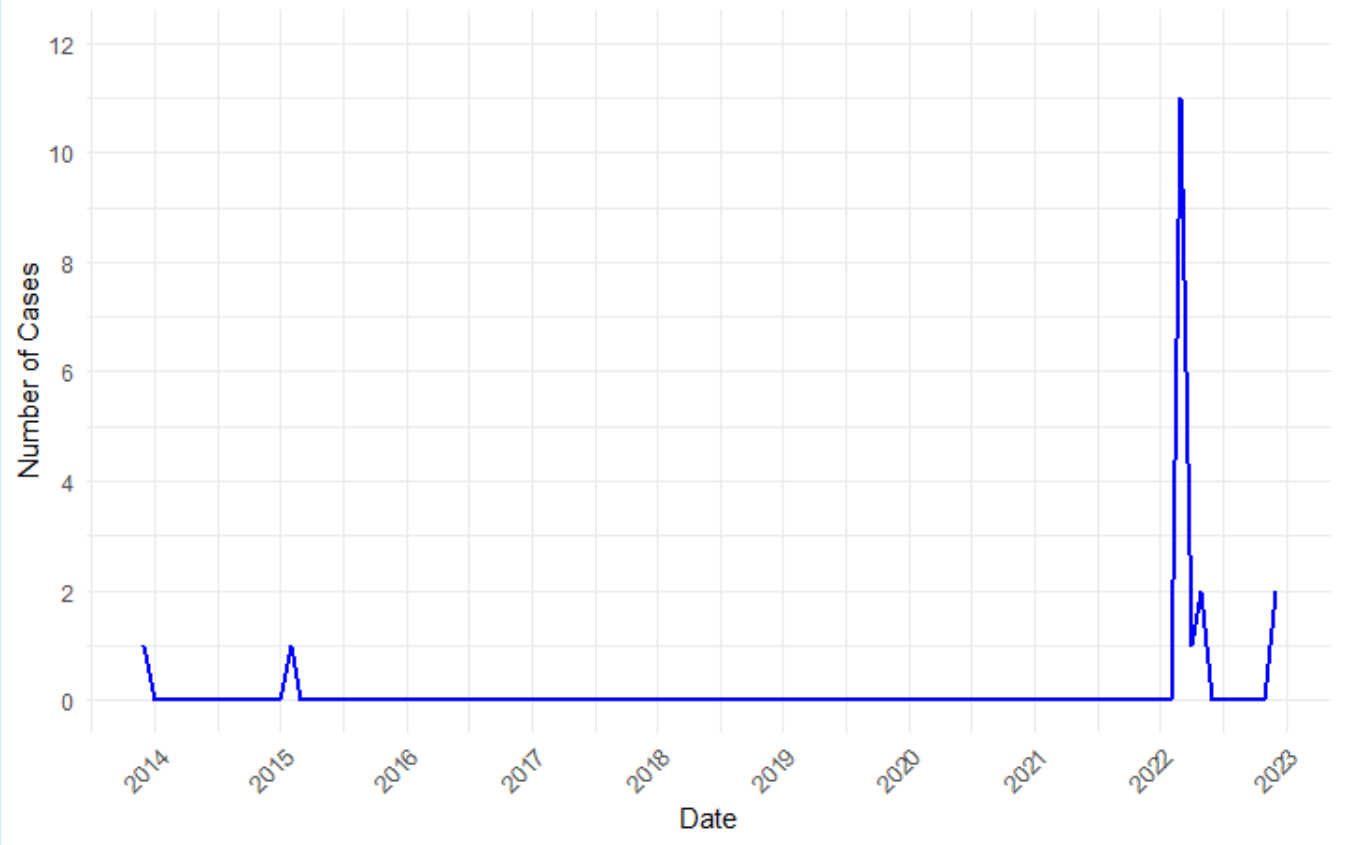


Figure 17: Japanese encephalitis virus notifications since December 2013, NSW



For further information on surveillance for human infections with vector-borne diseases, including exotic arbovirus infections, see the following:

- NSW Health Vector-borne diseases reports
- NSW Health Notifiable diseases data (and select the relevant disease).

Exotic mosquito detections at first points of entry

The Australian Government Department of Agriculture, Fisheries and Forestry (DAFF) is responsible for monitoring, surveillance and management of exotic mosquitoes at first points of entry including major Australian ports such as airports and approved arrangement facilities. The exotic mosquito species *Aedes aegypti* and *Aedes albopictus* both pose a serious biosecurity risk to Australia being major vectors of serious arboviral diseases including Dengue, Yellow Fever, Zika, and Chikungunya viruses. Table 5 shows detections for the period July 2022 to June 2023.

Table 5: Detections of exotic mosquitoes in NSW, July 2022 to June 2023

Date	Mosquito species	Sex	Location	Origin*
18 August 2022	*Aedes aegypti* (8)	F & M	Airport	Thailand
5 October 2022	*Aedes aegypti*	Female	Approved arrangement facility	Kuala Lumpur, Malaysia
24 October 2022	*Aedes aegypti*	Female	Approved arrangement facility	Kuala Lumpur, Malaysia
5 December 2022	*Aedes aegypti*	Female	Approved arrangement facility	Kuala Lumpur, Malaysia
6 December 2022	*Aedes aegypti*	Female	Approved arrangement facility	Kuala Lumpur, Malaysia
14 December 2022	*Aedes aegypti*	Female	Approved arrangement facility	Unknown
18 January 2023	*Aedes aegypti*	Female	Approved arrangement facility	Unknown
30 January 2023	*Aedes aegypti*	Female	Approved arrangement facility	Kuala Lumpur, Malaysia
27 March 2023	*Aedes aegypti*	Male	Airport	Kuala Lumpur, Malaysia

*Origin determined through population analyses.

Following the detections of exotic mosquitoes, insecticidal control and enhanced surveillance are undertaken as per the Australian Government Department of Health (2017), '*Response Guide for Exotic Mosquito Detections at Australian First Points of Entry*'.

Insecticidal control includes the use of thermal fogging along with residual surface sprays in the areas where the detections occurred. The enhanced surveillance includes the placement of additional mosquito traps and increased checking of the traps up to 40 days post detection of the exotic mosquitoes. These measures help ensure that Australia remains free of *Aedes albopictus* and insecticide resistant strains of *Aedes aegypti*.

Discussion

The start of the 2022-2023 season was marked by the third consecutive La Niña year. In the past, such climatic events always preceded large and widespread outbreaks of MVEV in the southeast of Australia. Both MVEV models (Nicholls and Forbes) predicted an MVEV outbreak for 2022-2023. With the emergence of Japanese encephalitis virus (JEV) in Australia in the preceding season (2021-2022), interactions and transmission dynamics between JEV and MVE were not well understood going into the current season.

MVEV activity in 2022-2023 was both widespread and prolonged across Australia. In NSW there were 21 MVEV detections from the mosquitoes and 45 MVEV seroconversions from the sentinel chickens. In Victoria there were 47 MVEV detections from mosquitoes, and South Australia had 10 MVEV detections from their mosquito collections. In Australia, the first detection occurred from mosquitoes trapped at Menindee (NSW) on 4 January 2023 and the last detections were from mosquitoes trapped at Loxton in South Australia from mid-April 2023 and in sentinel chicken flock located at Forbes (NSW) bled on 14 April 2023. Widespread activity was reported along the Murray, Murrumbidgee, Darling, and Macquarie Marshes regions.
In 2022-2023, there were 26 human notifications of MVEV across Australia, with 6 in NSW, 6 in Victoria, 1 in South Australia, 6 in Western Australia, 2 in Queensland and 5 in the Northern Territory. There were 8 deaths associated with the 26 notifications of MVEV. As with the Japanese encephalitis virus outbreak during 2021-2022, most MVEV human cases were in the age group of 50-70 years (14 cases). The last time there was a widespread MVEV outbreak in southeastern Australia was in 1974. The 1974 outbreak resulted in 58 human cases and 13 deaths. In both the 1974 and 2022-2023 outbreaks, MVEV was extremely widespread across the southeast part of Australia. There are a few reasons why there may have been fewer human cases in 2022-2023 in spite of Australia's population nearly being double what it was in 1974. In 1974, arboviral surveillance programs in Australia as well as human disease notification systems were not as well developed, meaning it may have been harder to identify the presence of MVEV early enough to take public health action. In response to JEV, Commonwealth Government funding was given to States and Territories for initiatives such as broad mosquito bite prevention and mosquito avoidance public health campaigns which may have helped reduce human cases of MVEV. The funding also supported widespread distribution of repellents to communities and extensive mosquito management was also undertaken in major towns in 2022-2023, especially along the Murray, which may have reduced the disease load.

The influence of the third consecutive La Niña year was reflected in the extremely high mosquito numbers in 2022-2023, which in turn helped drive the MVEV outbreak. This was a record mosquito season in several respects. This included the highest collection for any season, the highest number of mosquitoes trapped in one week, the highest number collected from one location in the same week, and a record catch from a single trap night. There were 395,047 mosquitoes trapped for the season (Table 1).). The week beginning 30 October 2022 produced a catch of 42,735 mosquitoes from Griffith, with 33,030 trapped overnight at one site, Lake Wyangan.

In November 2022 there were three traps from Griffith that were 'extreme' (average of >10,001/night), and there were around 40 collections from various locations that produced 'very high' (1,001-10,000) numbers. By mid-January, mosquito numbers had declined with the drier conditions, which then prevailed. Having large collections early in the season before *Culex annulirostris* numbers peaked may have helped prevent a more serious arboviral outbreak than what did occur.

Despite the widespread MVEV activity and the record mosquito numbers, relatively few of the other arboviruses were detected from the inland region. There were 8 Barmah Forest, 4 Ross River, 3 Edge Hill and 2 Kunjin virus detections in mosquitoes. These numbers would be considered low on an historical basis given the large mosquito collections. All the inland BFV detections occurred during the early part of the season, November and December, when collections were dominated by *Culex australicus* and *Anopheles annulipes.* The former species is not considered to be a human biter (and hence not a vector to humans), and the latter a less common biter compared to *Culex annulirostris*. Numbers of *Culex annulirostris* peaked later in the season, after the end of the BFV detections, and as this mosquito is a poor vector of BFV (although the major vector of MVEV, RRV, and JEV), few human cases of BFV disease were reported from the region.

The wet conditions also ensured that *Aedes vigilax* numbers were much lower this year. As previously reported, continual precipitation means that the saltmarsh habitats remain wet, preventing the required drying maturation period for the egg stage, and the flooded wetlands allows greater access to hatched larvae by aquatic predators. The 2021-2022 season which also experienced above average rainfall, only produced around 1,000 *Aedes vigilax*, whereas in 2022-2023 the total was close to 10,000. However, the majority of this was from a new trapping site in Newcastle that yielded around 7,000 *Aedes vigilax*.

Removing this figure, the total of 3,000, makes this one of the smallest yields of *Aedes vigilax* for the history of the NSW Arbovirus Surveillance Program. Numbers of *Aedes vigilax* only rose following the drier start of 2023, however the lower numbers early in the season meant that large collections did not subsequently prevail.

Like the other coastal sites, the Sydney traps yielded a lower overall percentage of *Aedes vigilax* this season due to the continual wet weather. Of the around 27,000 *Aedes vigilax* trapped, most (~23,000) came from the one site of Duck River. The other Sydney sites which have historically produced larger collections of *Aedes vigilax* (notably those along the Georges River), produced much lower yields of this species with mostly 'low' catches throughout the season.

BFV and RRV human notifications in 2022-2023 were lower than the 10-year average. This may have been due to lower counts of key vectors *Culex annulirostris* and *Aedes vigilax* early in the season, and overall numbers of *Aedes vigilax* being lower in 2022-2023. Public health messaging about bite prevention and investment in surveillance and mosquito reduction measures in response to MVEV and JEV may also have also contributed to lower human notifications of BFV and RRV.

Acknowledgements

The NSW ASMMP is funded and supported by the Environmental Health Branch at the NSW Ministry of Health. The program would not be possible without the support of Health Pathology NSW in processing and testing samples and organisations and individuals involved in mosquito trapping and sentinel chicken surveillance including, public health units, local councils, and various community members. The Animal Ethics Committee at Westmead Hospital approved the sentinel chicken component of the program. The exotic mosquito data is courtesy of the Australian Government Department of Agriculture, Fisheries and Forestry.


NSW
GOVERNMENT