NEW ZEALAND BIOSECURE

BORDER HEALTH NEWSLETTER – JUNE 2022

NAU MAI, HAERE MAI - WELCOME!

Kia ora koutou katoa,

This month we had the pleasure to meet with another amazing group of HPOs during the second Medical Vectors Surveillance Workshop in Christchurch. We hope you all enjoyed the workshop as much as we did!

We would like to remind everyone that it is required by the EPA to record weather data in samples, for the use of S-Methoprene in surveillance. This should be entered in the weather data section of the Online National Mosquito Surveillance Database or in the comments section if uploading samples via CSV file.

In the news this month, learn about how Dengue and Zika viruses make infected individuals smell extra good to mosquitos and how molecules in the mosquito's saliva makes it easier for viruses to pass from the infected mosquito to humans. Also learn about the importance of gene Ir76b in Anopheline mosquitoes and how editing this gene can interfere with essential behaviours. Then come a little closer to home and take a look at a summary of the mosquito interceptions at New Zealand's borders by Massey University's Environmental Health Intelligence New Zealand group. Don't like being woken up while you're sleeping?

Well, turns out mosquitoes don't either. Read about it in a study about how mosquitoes would rather catch up on sleep than bite.

Once again, we have a selection of practice mozzie pictures taken at the Medical Vectors Surveillance Workshop. In the Know Your Mosquito section, you can learn a bit about an endemic mosquito species *Opifex fuscus*, the larvae of which made an appearance at the workshop.

Happy reading!

SURVEILLANCE

During the month of June, 909 routine samples were collected by staff from 12 DHBs (Figure 1). The samples included 52 positive larval samples and 22 positive adult samples, leading to a total of 108 adults and 2640 larvae identified over the past month (Table 1). The dominant larval species this month is *Aedes notoscriptus*, the same as last year (Table 1).

Table 1. Number of adult and larvae sampled by the New Zealand surveillance program during June 2021 & 2022

Species (common name)	Adults		Larvae	
	June 22	June 21	June 22	June 21
Aedes antipodeus (winter mosquito)	3	-	-	-
Ae australis (saltwater mosquito)	-	-	2	-
Ae notoscriptus (striped mosquito)	5	-	2109	2671
Culex sp. (likely *quinquefasciatus* or *pervigilans*, missing key ID features)	10	4	-	-
Cx pervigilans (vigilant mosquito)	9	5	330	387
Cx quinquefasciatus (southern house mosquito)	83	21	176	550
Maorigoeldia argyropus (no common name)	-	-	-	7
Opifex fuscus (rock pool mosquito)	-	-	23	134
Total	**110**	**30**	**2640**	**3749**

In total, six mosquito species have been collected this month (Table 1), the same number collected last month.

Compared to this same month last year, mosquito larval numbers have shown a decrease (30% decrease) while adult numbers have shown an increase (267%) (Table 1).

Compared to the previous month, the total number of larvae is similar (1.5% increase), while the total number of adults has shown a decrease (95% decrease) (Table 1).

The highest number of larvae sampled this month was obtained in Northland DHB with a total of 1,957 larvae, followed by Taranaki DHB with 588 larvae (Figure 1).

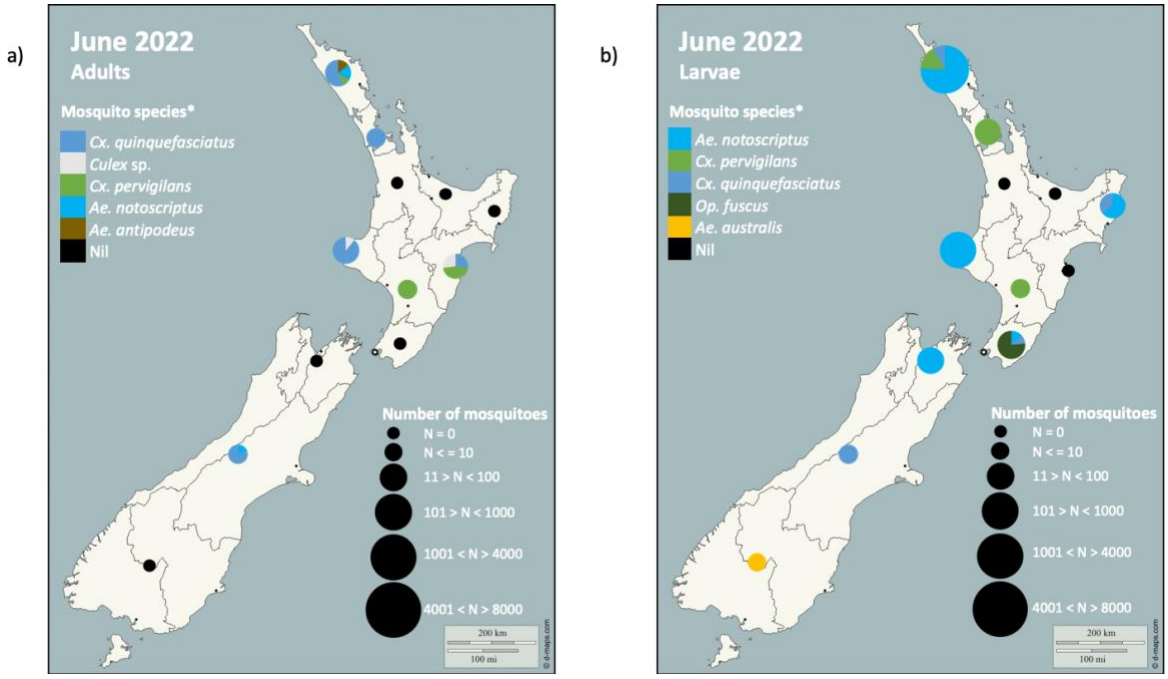


Figure 1. Total mosquito adults (a) and larvae (b) sampled in New Zealand during the June 2022 surveillance period. Please note that the markers represent the DHBs and not the specific sites where the samples have been taken.
* The mosquito species are listed in order from the most abundant to the least abundant.

Aedes notoscriptus larval numbers have shown an increase in two DHBs and a decrease in six DHBs from this same month last year (Figure 2). As expected, *Aedes notoscriptus* has not been recorded this month, this year, or last year in Public Health South (Figure 2).

Culex quinquefasciatus larval numbers have shown an increase in three DHBs and a decrease in five DHBs from this same month last year. *Culex quinquefasciatus* has not been recorded this month, this year, or last year in Public Health South (Figure 2).

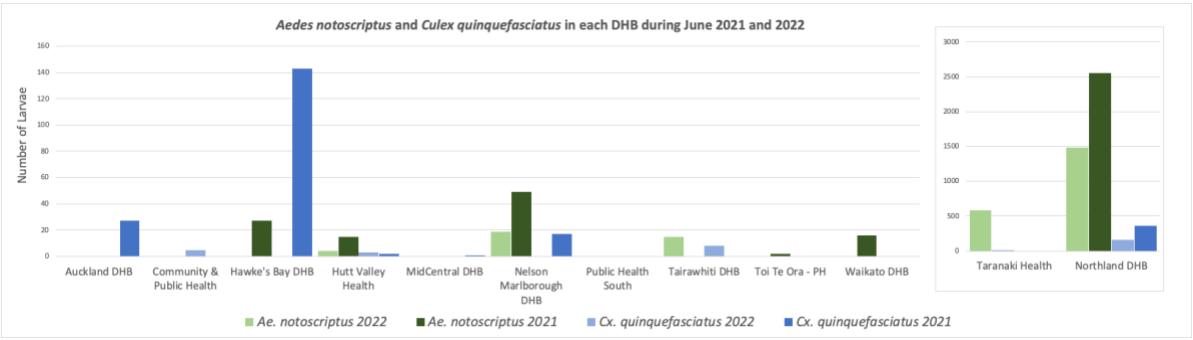


Figure 2. Comparison between introduced mosquito species sampled in each DHB during June 2021 and 2022.
*Please note the different scale for the number of larvae present in Northland DHB and Taranaki Health in comparison to the other DHBs.

INCURSIONS AND INTERCEPTIONS

During June, HPOs responded to one suspected interception (Table 2). The Lab also received notification of further detections of *Ae albopictus* eDNA in water samples matching the eDNA detected in Northland last year. It is proposed sampling and trapping be carried out at the site of the South Waikato detection next summer. The detections in Fiordland were likely due to contamination as the researcher usually works in Indonesia.

Table 2. Suspected interception during June 2022.

Date	Species	Location	Circumstances
21.06.22	1 male and 1 female *Culex quinquefasciatus*	Christchurch International Airport	The mosquitoes were found approximately 1m apart by a Community & Public Health staff member in their Border Health Room.
14.06.22	eDNA *Aedes albopictus*	South Waikato and Hodges Cove, Fiordland	DNA found in water samples, one originating from South Waikato and two originating from Fiordland.

NEWS ARTICLES FROM AROUND THE WORLD

Research Snapshot: Discovery of mosquito survival tactics leaves room for new disease vector control tactics

The appendages that protrude from a mosquito's head hold the sensory systems that account for nearly all of its ability to detect and respond to a wide range of chemical signals that are critical for its reproduction and its survival by facilitating a wide range of essential behaviours. To better understand how these chemosensory pathways help the malaria-carrying mosquito *Anopheles coluzzii* transmit disease, researchers at Vanderbilt University's Zwiebel Lab utilized CRISPR gene editing techniques to create mutant mosquitoes in which they could map and functionally characterize the role of a crucially important IR gene known as Ir76b. They found that this gene was required by Anopheline mosquitoes for mating and taking up a blood meal. Read more here.

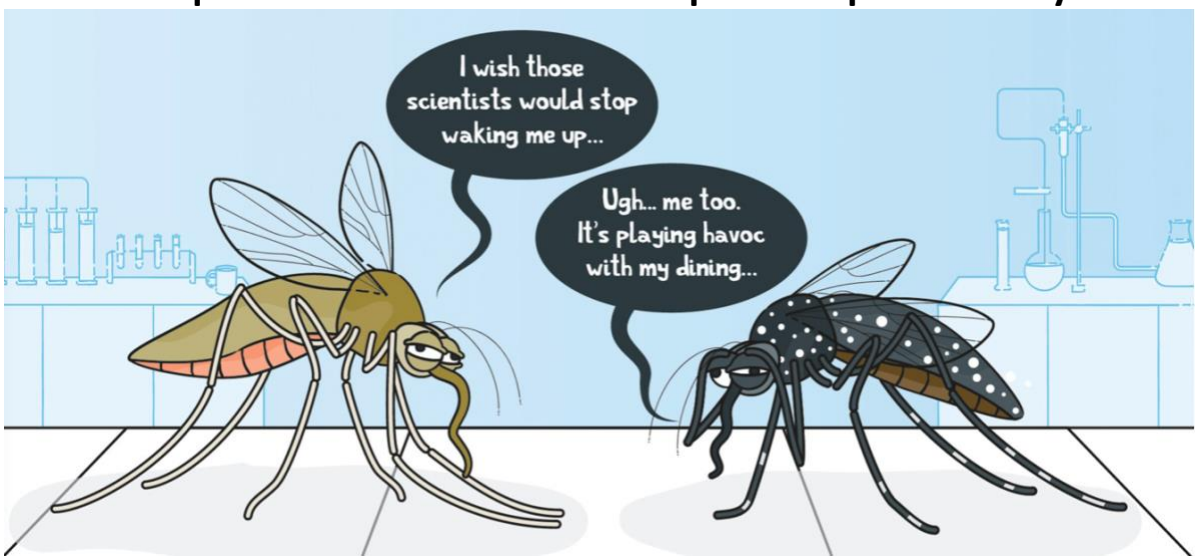
Targeting mosquito spit to halt Yellow Fever, Dengue and Zika

Researchers in the University of Leeds Virus Host Interaction Team have found a molecule in mosquito saliva called sialokinin makes it easier for viruses such as Zika, Dengue and yellow fever to pass from the mosquito to humans. Previously, sialokinin was determined allow increased blood flow and make it easier for the mosquito to feed, by altering the function lab grown of blood vessel cells. The researchers believe that blocking sialokinin may be a way to prevent severe disease following infections with various viruses. Read more. Access the original article.

Monitoring high-risk insects at New Zealand's borders

Exotic mosquitoes are considered a high-risk pest, which is why New Zealand's borders are monitored to prevent these mosquitoes from getting in. The Environmental Health Intelligence New Zealand (EHINZ) team from Massey University have released an analysis of interceptions of mosquitoes at New Zealand's borders, including information on where the mosquitoes have come from, and which locations and facilities had the highest number of interceptions. Read the summary and access the factsheet here.

Tired mosquitoes would rather catch up on sleep than bite you

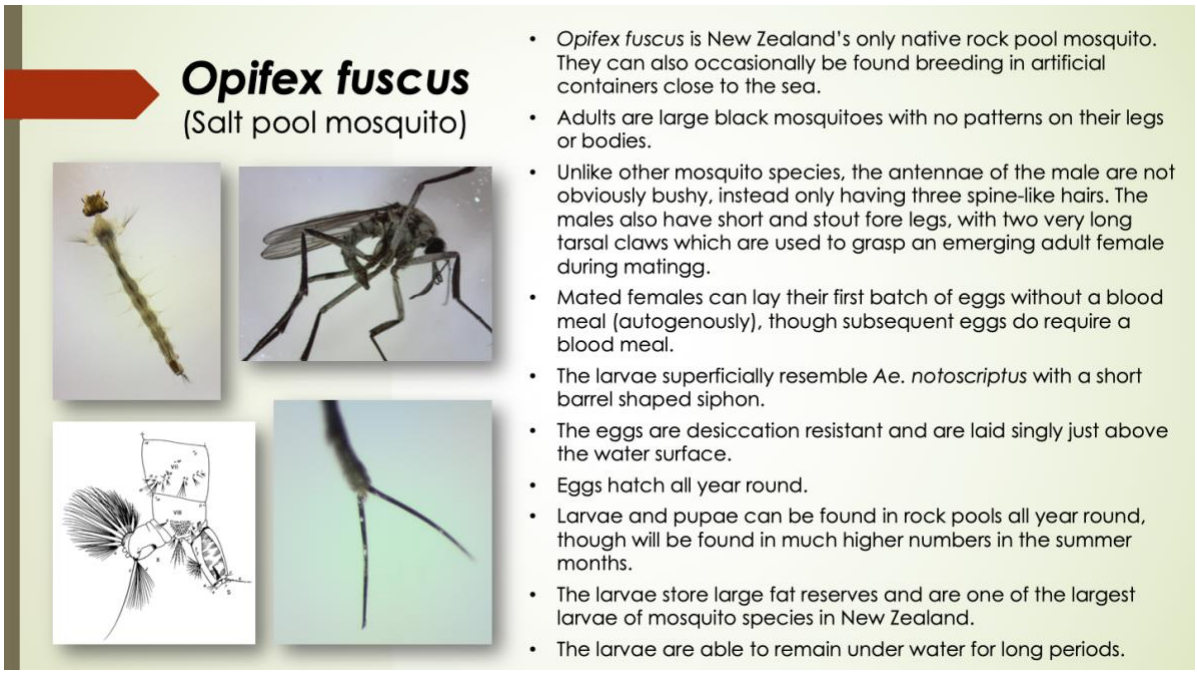


Feel a little tired and groggy after a night of disturbed sleep? Turns out mosquitoes do too! Researchers from the University of Cincinnati, USA, with colleagues also from Cincinnati and Virginia Tech, USA, filmed three species of mosquito (*Aedes aegypti*, *Culex pipiens* and *Anopheles stephensi*, which actively feast on blood at different times of day) to find out more about their slumber and how sleep loss affects them. Read more about it here.

How some viruses make people smell extra-tasty to mosquitoes

It has been known for many years that some diseases can change how their host smells, and researchers at Tsinghua University in Beijing wanted to see if Zika and dengue viruses had evolved ways to attract the attention of mosquitoes. The team used mice infected with either dengue or Zika and placed them in enclosures (with healthy mice in a separate enclosure as a control) and wafted their scent into a mosquito filled chamber to see which group the mosquitoes preferred. They found that around 65-70% of the mosquitoes went towards the infected mice, suggesting a preference of infected individuals. Analysis of the chemical compounds in the air of the enclosure found that infected mice produced ten times the amount of a compound called acetophenone than healthy mice, and that applying this compound to the skin of healthy mice, and a few healthy human volunteers, caused mosquitoes to be drawn to the smell. Read more here.

KNOW YOUR MOSQUITO



MOZZIE PHOTO PRACTICE TIME

RISK MAPS

Dengue Map – Centres for Disease Control and Prevention
Zika Map – Centres for Disease Control and Prevention
Malaria – Centres for Disease Control and Prevention
Malaria – World Health Organisation

DISEASE OUTBREAKS

To find out where the latest disease outbreaks have occurred visit:

Epidemic and emerging disease alerts in the Pacific region - Produced by the Pacific Community (SPC) for the Pacific Public Health Surveillance Network (PPHSN).

Disease Outbreak News - World Health Organization.

Public Health Surveillance - Institute of Environmental Science and Research (ESR) - Information for New Zealand Public Health Action.

Communicable disease threats report - European Centre for Disease Prevention and Control